14-49

NO. 14-___

IN THE

Supreme Court of the United States

NATIONAL MINING ASSOCIATION, PETITIONER

v.

ENVIRONMENTAL PROTECTION AGENCY, RESPONDENT

ON PETITION FOR WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE DISTRICT OF COLUMBIA CIRCUIT

PETITION FOR A WRIT OF CERTIORARI
VOLUME 1 of 4

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QUESTION PRESENTED

Whether an administrative agency, when authorized by Congress to regulate only if "appropriate," can deem the cost of the regulation irrelevant, with the result that, by the agency's own estimate, regulatory costs outweigh benefits by almost two thousand to one.

PARTIES TO THE PROCEEDING

The following were parties to the proceedings in the U.S. Court of Appeals for the District of Columbia Circuit:

The National Mining Association, the petitioner on review, was a petitioner and a respondent-intervenor below.

The respondent herein, which was the respondent below, is the United States Environmental Protection Agency.

Additional petitioners below were White Stallion Energy Center, LLC; American Public Power Association; ARIPPA; Chase Power Development, LLC; Edgecombe Genco, LLC; FirstEnergy Generation Corporation; Gulf Coast Lignite Coalition; Institute for Liberty; Julander Energy Company; Kansas City Board of Public Utilities; Midwest Ozone Group; National Black Chamber of Commerce; the Utility Air Regulatory Group; Oak Grove Management Company, LLC; Peabody Energy Corporation; Puerto Rico Electric Power Authority; Spruance Genco, LLC; State of Alabama; State of Alaska; State of Arizona; State of Arkansas, ex rel. Dustin McDaniel, Attorney General; State of Florida; State of Idaho; State of Indiana; State of Kansas; State of Michigan; State of Mississippi; State of Missouri; State of Nebraska; State of North Dakota; State of Ohio; State of Oklahoma; Commonwealth of Pennsylvania; State of South Carolina; State of Texas; Texas Commission on Environmental Quality; Texas Public Utility Commission; Railroad Commission of Texas; State of Utah; Commonwealth

of Virginia; State of West Virginia; State of Wyoming; Terry E. Branstad, Governor of the State of Iowa on behalf of the People of Iowa; Jack Conway, Attorney General of Kentucky; Tri-State Generation and Transmission Association, Inc.; United Mine Workers of America; West Virginia Chamber of Commerce, Inc.; Georgia Association of Manufacturers, Inc.; Indiana Chamber of Commerce, Inc.; Indiana Coal Council, Inc.; Kentucky Chamber of Commerce, Inc.; Kentucky Coal Association, Inc.; North Carolina Chamber; Ohio Chamber of Commerce; Pennsylvania Coal Association; South Carolina Chamber of Commerce; The Virginia Chamber of Commerce; The Virginia Coal Association, Incorporated; West Virginia Coal Association, Inc.; Wisconsin Industrial Energy Group, Inc.; Wolverine Power Supply Cooperative, Inc.; Chesapeake Climate Action Network; Conservation Law Foundation; Environmental Integrity Project; and Sierra Club.

Respondent-intervenors below (with respect to certain petitions for review) were Commonwealth of Massachusetts; State of California; State of Connecticut; State of Delaware; State of Illinois; State of Iowa; State of Maine; State of Maryland; State of Minnesota; State of New Hampshire; State of New Mexico; State of New York; State of North Carolina; State of Oregon; State of Rhode Island; State of Vermont; City of Baltimore; City of Chicago; City of New York; District of Columbia; County of Erie, New York; Calpine Corporation; Chase Power Development, LLC; Exelon Corporation; National Grid Generation LLC; Public Service Enterprise Group, Inc.; Gulf Coast Lignite Coalition; Institute for Liberty; Lignite Energy Council; National Black Chamber of Commerce; National Mining Association;

Oak Grove Management Company, LLC; Peabody Energy Corporation; Sunflower Electric Power Corporation; Tri-State Generation and Transmission Association, Inc.; Utility Air Regulatory Group; White Stallion Energy Center, LLC; American Academy of Pediatrics; American Lung Association; American Nurses Association; American Public Health Association; Chesapeake Bay Foundation; Citizens for Pennsylvania's Future; Clean Air Council; Conservation Law Foundation; Environment America; Environmental Defense Fund; Izaak Walton League of America; National Association for the Advancement of Colored People; Natural Resources Council of Maine; Natural Resources Defense Council; Ohio Environmental Council; Physicians for Social Responsibility; Sierra Club; and Waterkeeper Alliance.

A respondent below (with respect to certain petitions for review) was Lisa Perez Jackson, Administrator, United States Environmental Protection Agency. Ms. Jackson ceased to hold the office of Administrator, United States Environmental Protection Agency, on February 15, 2013; that office is currently held by Gina McCarthy, Administrator, United States Environmental Protection Agency.

RULE 29.6 DISCLOSURE STATEMENT

The National Mining Association is a non-profit, incorporated national trade association whose members include the producers of most of America's coal, metals, and industrial and agricultural minerals; manufacturers of mining and mineral processing machinery, equipment, and supplies; and engineering and consulting firms that serve the mining industry. NMA has no parent companies, subsidiaries, or affiliates that have issued shares or debt securities to the public, although NMA's individual members have done so.

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PETITION FOR A WRIT OF CERTIORARI

The National Mining Association respectfully petitions for a writ of certiorari to review the judgment of the United States Court of Appeals for the D.C. Circuit.

OPINION BELOW

The opinion of the D.C. Circuit is reported at *White Stallion Energy Center v. EPA*, 748 F.3d 1222 (D.C. Cir 2014) and is reproduced at Petition Appendix ("Pet. App.") 1a.

JURISDICTION

The D.C. Circuit entered judgment on April 15, 2014. *White Stallion*, 748 F.3d 1222; Pet. App. 99a. This Court has jurisdiction under 28 U.S.C. § 1254(1).

STATUTORY AND REGULATORY PROVISIONS

This case was decided under 42 U.S.C. § 7412, which is reproduced at Pet. App. 101a. The relevant agency regulation is National Emissions Standards for Hazardous Air Pollutants from Coal- and Oil-Fired Electric Utility Steam Generating Units and Standards of Performance for Fossil-Fuel-Fired Electric Utility, Industrial-Commercial-Institutional, and Small Industrial-Commercial-Institutional Steam Generating Units, 77 Fed. Reg. 9,304 (Feb. 16, 2012), which is reproduced at Pet. App. 196a.

INTRODUCTION

The divided Panel below affirmed regulations of the Environmental Protection Agency (EPA or

Agency) setting standards for the emission of hazardous air pollutants (HAPs) from electric utility steam generating units (hereafter electric generators) under the Clean Air Act (CAA). *See* 77 Fed. Reg. 9,304, Pet. App. 196a-201a. EPA acted under 42 U.S.C. § 7412(n)(1)(A), Pet. App. 156a, which authorizes EPA to regulate electric generator HAP emissions but only if EPA finds that regulation is "appropriate and necessary."

EPA projected that these regulations will inflict $9.6 *billion* in costs on the American people *annually* but will create only $4-6 *million* in annual benefit in reduced HAP emissions. 77 Fed. Reg. at 9,306, Table 2, Pet. App. 208a. EPA contends that this result is "appropriate and necessary," and the Panel affirmed. *White Stallion,* 748 F.3d at 1236-41, Pet. App. 20a-33a. But there is no possible interpretation of the words "appropriate and necessary" that could lead to such an unbalanced outcome. No rational person would see spending $9.6 billion for $4-6 million in return as an appropriate exchange.

EPA and the Panel contend that the Agency is free to ignore the costs of these regulations in determining that regulation is "appropriate and necessary." *White Stallion,* 748 F.3d at 1236-41, Pet. App. 20a-33a. But as Judge Kavanaugh argued in his dissenting opinion, where, as here, Congress authorizes regulation only where "appropriate and necessary," it is presumptively unreasonable for an agency not to consider costs and to choose to regulate despite such absurdly mismatched costs and benefits. *Id.* at 1260-66, Pet. App. 71a-85a.

The irrationality of EPA's action is starkly illuminated by EPA's conclusion that it is "appropriate and necessary" to regulate electric generator acid gas emissions, one of several forms of hazardous pollutants emitted by electric generators. 77 Fed. Reg. at 9,363, Pet. App. 461a-465a. EPA was unable to calculate *any* benefit from regulating electric generator acid gas emissions, 77 Fed. Reg. at 9,306, Table 2, Pet. App. 208a, and it conceded that acid gases, in the small quantities emitted by electric generators, do not pose any risk to public health, National Emission Standards for Hazardous Air Pollutants from Coal- and Oil-Fired Electric Utility Steam Generating Units, Proposed Rule, 76 Fed. Reg. 24,976, 25,016 (May 3, 2011), Pet. App. 1161a, 1342a ("our case studies did not identify significant chronic non-cancer risks from acid gas emissions") and *id.* at 25,011-12, Pet. App. 1317a-1323a (generator HAP emissions that may pose a cancer risk do not include acid gases). The Agency claimed that electric generator acid gas emissions pose a risk to the environment, but the only concrete evidence it could marshal in support is a single study from the United Kingdom that does not even address electric generator acid gas emissions, much less the acid gas emissions that EPA will now regulate from domestic generators. 77 Fed. Reg. at 9,362, Pet. App. 457a-461a. Yet the pollution controls needed to reduce acid gas emissions under EPA's regulation drive much of the $9.6 billion annual overall cost of the regulation. 76 Fed. Reg. at 25,014, Pet. App. 1327a-1331a.

Why then did EPA adopt regulations with such high costs and so little benefit? Not because Congress commanded that result. The Panel read the

term "appropriate" in Section 7412(n)(1)(A) as giving EPA *Chevron* step two discretion to either consider or not consider potential compliance costs. *White Stallion*, 748 F.3d at 1238, Pet. App. 25a-26a (EPA's interpretation that the term "appropriate" does not "*compel[]*" it to consider costs "is clearly permissible") (emphasis added). *See Chevron, U.S.A., Inc. v. Natural Resources Defense Council, Inc.*, 467 U.S. 837, 843 (1984). EPA chose to ignore compliance costs in deeming it "appropriate" to regulate, claiming this was a "reasonable" interpretation of the discretion Congress gave it. 77 Fed. Reg. at 9,326-27; Pet. App. 294a-302a. The decision to adopt regulations with such unbalanced costs and benefits, therefore, was EPA's, not Congress'.

The reason why EPA chose such a seemingly irrational outcome is obvious but largely ignored by the Panel decision. The pollution-control equipment that electric generators must install to control acid gases also reduces emissions of sulfur dioxide (SO_2), a non-hazardous pollutant that is not subject to regulation under Section 7412. 76 Fed. Reg. at 25,014, Pet. App. 1327a-1331a. Sulfur dioxide can convert in the atmosphere to fine particles ($PM_{2.5}$), and EPA believes that reducing atmospheric fine particle concentrations will produce tens of billions of dollars in annual benefit in reduced mortality and disease. 77 Fed. Reg. at 9,306, Table 2, n. b, Pet. App. 208a. However, even EPA was forced to concede that reducing fine particle concentrations is not a valid objective under Section 7412, *id.* at 9,320, Pet. App. 268a-272a, and, in any event, EPA is already required under the CAA Title I National Ambient Air Quality Standards program to control fine particle

concentrations to safe levels. *See Nat'l Ass'n of Mfrs. v. EPA*, 750 F.3d 921 (D.C. Cir. 2014).

EPA's "appropriate and necessary" determination thus is a textbook case of the administrative misuse of statutory authority. The Agency has adopted a regulation that no rational person would adopt in order to achieve an objective that the statutory program under which it is acting does not authorize. *Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983) ("Normally, an agency rule would be arbitrary and capricious if the agency has relied on factors which Congress has not intended it to consider."). *See also Chevron*, 467 U.S. at 8444 (under step two, agency statutory interpretation must be "reasonable").

The Panel's decision thus raises issues of exceptional importance that warrant granting this Petition under Rule 10(a). In the first place, EPA's regulations are "among the most expensive rules that EPA has ever promulgated." JAMES E. MCCARTHY, CONG. RESEARCH SERV., R42144, EPA'S UTILITY MACT: WILL THE LIGHTS GO OUT? 1 (2012), as cited in Judge Kavanuagh's dissenting opinion, *White Stallion*, 748 F.3d at 1263, Pet. App. 78a. In his opinion, Judge Kavanaugh provided some context for the $9.6 billion annual cost of the rule:

> To put it in perspective, that amount would pay the annual health insurance premiums of about two million Americans. It would pay the annual salaries of about 200,000 members of the U.S. Military. It would cover the annual

> budget of the National Park Service three times over.

Id. at 1263, Pet. App. at 77a-78a.

The decision also has enormous precedential importance for administrative law. Regulatory decisionmaking in the modern state inevitably involves trade-offs. "[E]very real choice requires a decisionmaker to weigh advantages against disadvantages, and disadvantages can be seen in terms of (often quantifiable) costs." *Entergy Corp. v. Riverkeeper, Inc.* 556 U.S. 208, 232 (2009). Of course, Congress is free to command regulation no matter the cost. *Whitman v. American Trucking Associations*, 531 U.S. 457, 466 (2001) (finding that Congress did not intend EPA to consider compliance costs in setting ambient air quality standards). But Congress issued no such command here. It mandated regulation only if "appropriate and necessary." To hold that such a standard can be interpreted as authorizing the Agency to ignore the costs of its regulations, where the Agency itself finds that the costs and benefits are so disproportionate, is to undermine one of the key pillars on which judicial review of agency action is based—that agencies must act "within the bounds of reasonable interpretation." *Utility Air Regulatory Grp.*, 573 U.S. at ___ (June 23, 2014), slip op. at 16, citing *Arlington v. FCC*, 569 U.S. ___, ___ (2013) (slip op. at 5)). Recently, this Court reiterated that it expects Congress to speak clearly if it wishes to authorize an agency to make decisions of vast "economic and political significance." *Utility Air Regulatory Grp.*, 573 U.S. at ___, slip op. at 19 (citing cases). Little remains of that principle if an agency can convert a Congressional command to regulate

only as "appropriate" into a green light for imposing massive costs for little benefit, while disclaiming the responsibility to consider costs at all.

STATEMENT OF THE CASE

1. As part of the comprehensive 1990 CAA Amendments, Congress rewrote how EPA should regulate HAPs. 42 U.S.C. § 7412. *See New Jersey v. EPA*, 517 F.3d 574, 581-83 (D.C. Cir. 2008). Congress listed more than 100 HAPs, 42 U.S.C. § 7412(b), and directed EPA to create a list of categories of sources that emit those HAPs above statutorily-defined thresholds, 42 U.S.C. § 7412(c). Congress further directed EPA to establish HAP control standards for each of the source categories that EPA listed. 42 U.S.C. § 7412(b).

Congress, however, adopted a different regulatory scheme for the emission of HAPs from electric generators. In 42 U.S.C. § 7412(n)(1)(A), Congress required EPA to perform a study of the "hazards to public health" from electric generator HAP emissions "after imposition of [other] requirements of" the CAA. Congress directed that the study also include a report on "alternative control strategies for emissions which may warrant regulation under this section." *Id.* Congress further required EPA to regulate electric generator HAP emissions under Section 7412 but only if it "finds such regulation is *appropriate and necessary* after considering the results of the study required by this subparagraph." *Id.* (emphasis added).

Congress treated electric generators differently from other source categories of HAP emissions

because the 1990 CAA Amendments contained a number of other programs which would have the effect of reducing electric generator HAP emissions. Revision of December 2000 Regulatory Finding on the Emissions of Hazardous Air Pollutants from Electric Utility Steam Generating Units and the Removal of Coal- and Oil-Fired Electric Utility Steam Generating Units from the Section 112(c) List, 70 Fed. Reg. 15,994, 15,999 (Mar. 29, 2005). These programs included the Title IV Acid Deposition Control program, which established a cap-and-trade system for electric generator emissions of SO_2 and nitrogen oxides (NO_x) in order to reduce the effect these pollutants have on the acidification of aquatic and other ecosystems. 42 U.S.C. §§ 7651-7651o. Congress believed that electric generator HAP standards might not be necessary in light of these other programs, and it was also concerned that the electric utility industry might become overburdened with air pollution control costs. *See* 136 Cong. Rec. H12911, 12934 (daily ed. Oct. 26, 1990) (statement of Congressman Oxley) (stating that the conferees adopted section 7412(n)(1)(A) "because of the logic of basing any decision to regulate on the results of scientific study and because of the emission reductions that will be achieved and the extremely high costs that electric utilities will face under other provisions of the new Clean Air Act amendments.").

2. EPA completed the study called for by Section 7412(n)(1)(A) (Utility Study) in 1998. *See* http://www.epa.gov/ttn/atw/combust/utiltox/eurtc1.pdf. That study did not make any finding under that section. It concluded that "mercury from coal-fired utilities is the HAP of greatest potential concern." Utility Study at ES-27, Pet. App. 1940a. The study

found no health impacts from electric generator emissions of acid gases (hydrogen chloride and fluoride). *Id.* at ES-23, Pet. App. 1937a-1939a. EPA noted that acid gas emissions "may" possibly contribute to environmental harms but recognized that these impacts could also be addressed through other provisions of the Act. *Id.*

Based on the Utility Study, EPA in 2000 issued a non-final "notice of regulatory finding" that it was "appropriate and necessary" to regulate electric generators. Regulatory Finding on the Emissions of Hazardous Air Pollutants from Electric Utility Steam Generating Units, 65 Fed. Reg. 79,825 (Dec. 20, 2000). EPA's finding was based on the hazards to public health that EPA perceived from mercury emissions from coal-fired electric generators and, to a lesser extent, the effects of nickel emissions from oil-fired electric generators. *Id.* at 79,827, 79,828, Table 1. EPA made no findings as to acid gas emissions other than to briefly note that these emissions are of "potential concern and may be evaluated further during the regulatory development process." *Id.* at 79,827. EPA then listed electric generators for regulation under Section 7412(c) but deferred establishing control standards. National Emission Standards for Hazardous Air Pollutants: Revision of Source Category List Under Section 112 of the Clean Air Act, 67 Fed. Reg. 6,521 (Feb. 12, 2002).

In 2005, based on new information, EPA undertook rulemaking for the first time to evaluate whether regulating electric generator HAP emissions under Section 7412(n)(1)(A) was "appropriate and necessary." Unlike its non-final 2000 finding, which contained very little discussion of Congressional

intent, the Agency's 2005 finding provided a lengthy discussion of the reasons why Congress chose to uniquely authorize the regulation of electric generators only if "appropriate and necessary." 70 Fed. Reg. at 15,997-16,002. Based on its analysis, EPA concluded that costs should be considered in determining whether regulation is "appropriate" and that, as a result, "it might not be appropriate" to regulate electric generator HAP emissions "if the health benefits expected as the result of such regulation are marginal and the cost of such regulation is significant and therefore substantially outweighs the benefits." *Id.* at 16,000-01.

EPA did not reach the merits of that question—whether the benefits of Section 7412(n)(1)(A) regulation of electric generator HAP emissions was worth the cost—because EPA determined that, given other CAA programs, electric generator HAP emissions did not pose a meaningful health risk. 70 Fed. Reg. at 16,002. Because EPA had decided to regulate electric generator mercury emissions under another CAA program, it concluded that any remaining impacts from those emissions would be insignificant. *Id.* EPA further concluded that non-mercury HAPs emitted by electric generators should not be regulated under Section 7412, *id.* at 16,006-07, noting that further research on acid gas emissions confirmed the absence of any health impact, *id.* at 16,007. EPA therefore determined that it was not "appropriate and necessary" to regulate electric generator HAP emissions and removed electric generators from the Section 7412(c) list. *Id.* at 15,994.

EPA's 2008 "delisting" decision, however, was reversed and vacated by the D.C. Circuit in *New Jersey v. EPA*, 517 F.3d at 581-83, on the ground that EPA had not made the delisting findings required by Section 7412(c)(9).

3. On remand of *New Jersey*, EPA promulgated the rule at issue here. EPA again reversed course and determined that its original 2000 "appropriate and necessary" finding was valid when made. 77 Fed. Reg. at 9,320, Pet. App. 268a-272a. EPA also asserted that new information further and independently justified the appropriateness and necessity of regulating electric generator emissions of mercury, non-mercury trace metals, and acid gases. *Id.* at 9,362-64, Pet. App. 457a-470a.

a. Mercury Emissions.

The additional mercury information that EPA examined in its 2012 rulemaking involved an analysis of the watersheds in the United States where mercury concentrations were high enough to present a risk to a hypothetical high-risk individual, based on the threshold risk level identified in an earlier National Academy of Sciences report. *See generally* 76 Fed. Reg. at 25,007-10, Pet. App. 1298a-1314a, 77 Fed. Reg. at 9,344-56, Pet. App. 374a-434a. EPA defined the hypothetical high-risk individual as an unborn child of a pregnant woman who primarily subsists on self-caught fish from local waters. 76 Fed. Reg. at 25,007, Pet. App. 1299a-1300a. EPA then assumed that this individual consumes 13 ounces of locally caught fish every day during her pregnancy, 77 Fed. Reg. at 9,349, Pet. App. 397a, and that the mercury levels in the fish represent some of

the highest levels measured in each of the fresh water rivers and lakes for which EPA could find data, *id.*, Pet. App. 397a-401a. Although data are available for only four percent of the watersheds in the country, EPA applied its findings equally across all 88,000 watersheds in the United States. 76 Fed. Reg. at 25,007, Pet. App. 1302a. Based on this analysis, EPA claimed that at least one hypothetical high-risk individual may be present in 10 percent of all watersheds (when considering utility emissions alone) and 24 percent of all watersheds (when considering all global emissions). 77 Fed. Reg. at 9,362, Pet. App. 459a.

b. Non-Mercury Trace Metals.

As noted above, EPA's 2000 "appropriate and necessary" finding indicated that nickel emissions from oil-fired units was the only non-mercury trace metal that presented a potential risk. To support its 2012 finding, EPA modeled the emissions of nickel and a number of other trace metals from 16 facilities to determine the exact location of the highest impact from the emissions for each facility. 76 Fed. Reg. at 25,011-12, Pet. App. 1317a-1323a, 77 Fed. Reg. at 9,357-62, Pet. App. 434a-461a. EPA then assumed that a hypothetical individual would remain at that exact location 24 hours a day, 365 days a year, for 70 years to determine whether the increased cancer risk for that individual would exceed one-in-one-million. 77 Fed. Reg. at 9,358, Pet. App. 442a.

Using that framework, EPA determined that four electric generation facilities—three coal-fired facilities and one oil-fired facility—could potentially increase the cancer risk to a hypothetical high-risk

individual by greater than one-in-one-million. 76 Fed. Reg. at 25,011, Pet. App. 1317a. However, the only pollutants driving those increased risks were chromium+6 (for the coal-fired facility) and nickel (for the oil-fired facility). *Id.* EPA determined that no other pollutant resulted in a significant cancer risk, and EPA determined that all non-cancer risks were also insignificant. *Id.*

c. Acid Gas Emissions.

As speculative as EPA's analyses of mercury and non-mercury trace metals were, EPA did not even try to conduct any further analysis of any impacts of electric generator acid gas emissions that might remain after other CAA regulation. EPA conceded that electric generator acid gas emissions do not pose a health risk, but claimed that "acid gas HAP pose a hazard to the environment because they contribute to aquatic acidification." 77 Fed. Reg. at 9,310, Pet. App. 228a. The Agency, however, did not provide any analysis of why acid gas emissions, in the amount emitted by electric generators given compliance with the CAA Title IV Acid Deposition Control program, pose an acidification risk. The only empirical evidence that EPA cited was a study of acid deposition in the United Kingdom, which obviously did not examine whether the electric generators that will be subject to the rule here emit acid gases in sufficient quantity to cause a regulatory concern. 77 Fed. Reg. at 9,361-62, Pet. App. 452a-461a. Indeed, the study did not examine electric generator acid gas emissions at all. *Id.*

4. EPA proceeded to promulgate stringent control requirements to minimize emission of all

HAPs emitted by electric generators. 76 Fed. Reg. at 25,102-47, Pet. App. 898a-1936a. EPA estimated that the annual compliance cost of these regulations would be $9.6 billion. 77 Fed. Reg. at 9,306, Table 2, Pet. App. 208a. In contrast, EPA estimated that the benefit of regulating these substances was only $4-$6 million annually. *Id.* A substantial part of the control costs results from the need for numerous generators to install expensive SO_2 control equipment as a means of controlling acid gas emissions. 76 Fed. Reg. at 25,014, Pet. App. 1327a-1331a. None of the EPA-estimated $4-6 million in annual regulatory benefits, however, comes from reducing acid gas emissions. 77 Fed. Reg. at 9,306, Table 2, Pet. App. 208a.

EPA claims that, overall, the regulation will create $33-$90 billion in benefits. *Id.*, n. b, Pet. App. 208a. But virtually all of this amount consists of what EPA describes as a "co-benefit" of reducing SO_2 emissions, because SO_2 converts in the atmosphere to fine particles which, according to EPA, cause increased mortality and morbidity. *Id.* However, because SO_2 and fine particles are not HAPs, EPA recognizes, as it must, that it cannot rely on these asserted co-benefits in deeming it to be "appropriate and necessary" to regulate electric generator HAPs. 77 Fed. Reg. at 9,320, Pet. App. 268a-272a.

Aware of the yawning disparity between the costs and benefits of its regulations, EPA decided to change its previous interpretation that regulatory costs should be considered in making the "appropriate and necessary" determination. 77 Fed. Reg. at 9,327, Pet. App. 298a-302a. EPA now decided that it could ignore control costs. *Id.* The Agency

asserted that ignoring costs was reasonable given what it viewed as Congress' overriding concern to regulate the public health and environmental hazards of electric generator HAP emissions as quickly as possible and no matter the costs involved. *Id.* And EPA sought to further immunize its decision to regulate acid gas emissions by interpreting Section 7412 as requiring EPA to regulate acid gas emissions—even if those emissions do not pose a health or environmental danger—so long as EPA could find that electric generator emissions of another hazardous pollutant do pose a danger. *Id.* at 9,325-26, Pet. App. 290a-298a.

REASONS FOR GRANTING THE PETITION

Certiorari should be granted to review the Panel's decision. The regulation at issue indisputably entails massively high compliance costs for virtually no benefit from reducing HAP emissions. 77 Fed. Reg. at 9,306, Table 2, Pet. App. 208a. The Panel sanctioned this result on the ground that an ambiguous statutory term—authorizing EPA to regulate if "appropriate"—could reasonably be construed as a congressional authorization of regulation regardless of the cost. *White Stallion,* 748 F.3d 1236-41, Pet. App. 20a-33a. But this Court has consistently held, most recently this past term, that it will not read into a statute the authority for an agency to engage in highly consequential regulation unless Congress has "sp[oken] clearly." *Utility Air Regulatory Grp.*, 573 U.S. at __ , slip op. at 19.

That principle is at issue in this case. Although Congress could, of course, authorize regulation without regard to the cost, it did not do so

here. It only authorized "appropriate" regulation. As Judge Kavanaugh wrote, it is presumptively unreasonable for an agency, given authority to regulate where "appropriate," to ignore costs and to thereby produce regulation with costs that are nearly 2,000 times higher than its benefits. *White Stallion*, 748 F.3d at 1266, Pet. App. 83a-85a. The irrationality of EPA's decisionmaking is made even worse by the fact that the Panel sanctioned EPA's view that it can regulate *all* electric generator HAPs, even those that do not pose a health or environmental risk, so long as *some* electric generator HAPs do pose such a risk. *Id.* at 1244, Pet. App. 37a-39a. The regulatory scheme the Panel has approved thus would not only entail massively high regulatory costs for little health or welfare benefit; in addition, much of those costs could be expended for *no* benefit. Given the far-reaching precedential impact this decision could have for all forms of government regulation, this Court should not let the Panel's decision stand.

I. EPA Unreasonably Failed to Consider Costs.

Both the Panel and EPA asserted that because the term "appropriate" is ambiguous, the Agency had discretion to interpret the term under *Chevron* step two. *White Stallion*, 748 F.3d at 1237, Pet. App. 23a-25a. But statutory ambiguity does not mean that an agency's discretion is uncabined. As this Court has consistently held, "[e]ven under *Chevron's* deferential framework, agencies must operate 'within the bounds of 'reasonable interpretation.'" *Utility Air Regulatory Grp.*, 573 U.S. at ___, slip op. at 16 (citing *Arlington v. FCC*, 569 U.S. ___, ___ (2013) (slip op. at 5)).

Moreover, as the D.C. Circuit has noted, "the range of permissible interpretations of a statute is limited by the extent of its ambiguity;" an agency cannot "put forth a reading that diverges from any realistic meaning of the statute." *Massachusetts v. United States DOT*, 93 F.3d 890, 893 (D.C. Cir. 1996); *see also Massachusetts v. EPA*, 549 U.S. 497, 533 (2007) (agency must "exercise discretion within defined statutory limits"). Contrary to the Panel's reading, there is no "realistic meaning" of the term "appropriate" that encompasses the mismatch of costs and benefits that EPA's regulation creates. *See MCI Telcomms. Corp.* v. *AT&T*, 512 U.S. 218, 231 (1994) (disapproving agency statutory interpretation as leading to "highly unlikely" result). The dictionary defines "appropriate" as "especially suitable or compatible" or "fitting." MERRIAM-WEBSTER ONLINE DICTIONARY, http://www.merriam-webster.com/dictionary/appropriate (last visited July 8, 2014). A regulatory scheme that produces costs almost 2,000 times its benefits is not one that is "especially suitable," "compatible" or "fitting" under any common understanding of those terms. *See FDIC v. Meyer*, 510 U.S. 471, 476 (1994) ("we construe a statutory term in accordance with its ordinary or natural meaning" unless Congress has otherwise specified).

Indeed, EPA conceded that the term appropriate is "extremely broad," 76 Fed. Reg. at 24,988, Pet. App. 1216a, and the Panel similarly characterized the term as "broad," *White Stallion*, 748 F.3d at 1237, Pet. App. 25a. Congress' use of such a broad term contradicts EPA's and the Panel's conclusion that Congress was narrowly focused on regulation no matter the cost. *Christopher v. SmithKline Beecham Corp.*, 132 S. Ct. 2156, 2171

(2012) ("broad" statutory term should not be given an unreasonably limited construction); *Harrison* v. *PPG Industries, Inc.*, 446 U.S. 578, 588-89 (1980) (Congress' use of "expansive language" contradicts a more limited reading of a statutory term). "It is the settled law of this circuit," the D.C. Circuit has said, that "[i]t is only where there is a 'clear congressional intent to preclude consideration of cost' that we find agencies barred from considering costs." *Michigan v. EPA*, 213 F.3d 663, 678 (D.C. Cir. 2000) (quoting *NRDC v. EPA*, 824 F.2d 1146, 1163 (D.C. Cir. 1987). The use of a "broad" term like "appropriate" is hardly consistent with a "clear congressional" intent to exclude costs.[1]

The Panel properly recognized that the meaning of facially ambiguous terms must be discerned through their "context" in the statute. *White Stallion*, 748 F.3d at 1237, Pet. App. 24a (citing *Sossamon v. Texas*, 131 S. Ct. 1651, 1659 (2011) for the proposition that the term "appropriate" is "inherently context-dependent"). But, as noted above, this Court has said, "[w]e expect Congress to speak

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[1] The Panel contended that *Michigan* may have authorized EPA to consider costs here but did not command it. *White Stallion*, 748 F.3d at 1236, Pet. App. 20a-23a. But EPA's discretion to either consider or not consider costs must be exercised reasonably; as Judge Kavanuagh wrote, failing to consider costs in deeming regulation "appropriate" is unreasonable. *Id.* at 1266, Pet. App. 83a-85a. *Whitman* is not to the contrary. In *Whitman*, 551 U.S. at 466-68, this Court ruled that EPA may not consider costs in setting ambient air quality standards under 42 U.S.C. § 7409(b)(1) because the statutory command to establish standards that are "requisite to protect the public health" does not "leave room" to consider costs. In contrast, the broad phrase "appropriate and necessary" leaves ample room for consideration of costs.

clearly if it wishes to assign to an agency decisions of vast 'economic and political significance.'" *Utility Air Regulatory Grp.*, 573 U.S. __, slip op at 19 (citing *FDA v. Brown & Williamson Tobacco Corp.*, 529 U.S. 120, 133 (2000)). The Panel's contextual analysis reveals no such clear intent.

The Panel gave controlling weight to the fact that other subsections of Section 7412 provide for the consideration of costs, while Section 7412(n)(1)(A) supposedly does not. *White Stallion*, 748 F.3d at 1237-38, Pet. App. 23a-27a. But the Panel continually mischaracterizes the Section 7412(n)(1)(A) study as being limited to an examination of the health effects of electric generator HAP emissions, with Congress giving "no signal" that regulatory compliance costs would be relevant. *White Stallion*, 748 F.3d at 1240, Pet. App. 29a. Section 7412(n)(1)(A), however, requires that EPA study *both* health effects *and* "alternative control strategies for emissions which may warrant regulation." The mandate for EPA to consider compliance options is not consistent with a congressional intent to authorize EPA to deem the cost of those compliance options irrelevant. *Ali v. Federal Bureau of Prisons*, 552 U.S. 214, 222 (2008) (statutory terms should be construed to be "coherent and consistent").

The Panel also concluded that EPA's decision not to consider costs was consistent with Congress' overall purpose in Section 7412 to "spur EPA to action" in regulating HAPs. *White Stallion*, 748 F.3d at 1238, Pet. App. 26a. Given this purpose, the Panel read Section 7412(n)(1)(A) as doing nothing more than providing EPA with a "three-year pass" to "confirm the nature of public health hazards from

EGU [electric generator] emissions," after which regulation becomes mandatory. *Id.* at 1238-39, Pet. App. 26a-29a.

Petitioners do not dispute that the Section 7412 technology-based regulatory structure, for non-electric-generator source categories, limits EPA's discretion as compared with the previous statutory HAP program. Thus, in contrast to the pre-1990 version of Section 7412, *White Stallion*, 748 F.3d at 1230 Pet. App. 9a, the provision now establishes a simple two-step regulatory process that limits EPA's discretion in deciding whether and how to impose new emission standards. First, EPA must determine whether a source category emits one of the many HAPs that Congress specified in 42 U.S.C. § 7412(b) in quantities that exceed the statutorily-defined threshold. 42 U.S.C. § 7412(c). EPA must then establish emissions-control standards that are at least as stringent as the standards that would result from the application of a statutory formula. 42 U.S.C. § 7412(d).

It is also true, however, that Congress established a separate procedure for determining whether electric generator HAP emissions should be regulated. Although electric generators emit HAPs that are included on the Section 7412(b) list in amounts that exceed the statutory threshold, Congress did not automatically require EPA to regulate under Section 7412(d). Not only did Congress mandate a study of both health hazards and potential compliance options, Congress also authorized regulation only if it was "appropriate and necessary." Had Congress intended that the normal statutory procedure would be triggered if EPA found

that electric generator HAPs create a health hazard, it would have been a simple matter to direct EPA, upon making a health hazard finding, to conform to the statutory procedure for regulating every other source category of HAPs—to list generators under Section 7412(c) and then set standards under Section 7412(d). Instead, Congress chose to granted EPA much broader to choose to regulate—or not—within the broad confines encompassed by the phrase "appropriate and necessary." *See Central Bank of Denver v. First Interstate Bank of Denver*, 511 U.S. 164, 176-77 (1994) (failure of Congress to include a specific provision in one part of statute, where it included that provision in another, is evidence of Congress' differing intent for the two provisions).

Indeed, the Panel itself implicitly recognized that the broad phrase "appropriate and necessary" gave EPA the authority to decline to regulate even if the Utility Study found that electric generator HAPs create a health hazard. Under the logic of the Panel's *Chevron* step two analysis, since EPA could have made the choice to consider costs, it could also have decided that regulatory costs so exceeded regulatory benefits as to make regulation inappropriate.[2]

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[2] Moreover, both EPA and the Panel conclude that EPA can regulate electric generator HAP emissions if it finds that these emissions cause environmental impacts, even through the Section 7412(n)(1)A) study that Congress mandated was limited to health effects. *White Stallion*, 748 F.3d at 1241-42, Pet. App. 31a-35a. Neither the Panel nor EPA explain why it is consistent to use the "appropriate and necessary" finding to expand regulation to environmental impacts while limiting that finding to exclude costs.

Of course, as discussed, even if EPA's Section 7412(n)(1)(A) discretion is broad, EPA must still exercise that discretion reasonably. In the end, then, the issue before the D.C. Circuit was whether EPA reasonably exercised its discretion by determining not to consider costs and that it was therefore "appropriate" to adopt massively costly regulations for virtually no return. The Panel attempted to dismiss this irrational result by citing EPA's claim of $37-$90 billion in annual benefits. *White Stallion*, 748 F.3d at 1240, Pet. App. 30a. But the Panel failed to note that these benefits do not result from regulating hazardous pollutants or that even EPA itself said it could not rely on these benefits to justify the rule. 77 Fed. Reg. at 9,320, Pet. App. 268a-272a. As a result, the rationality of EPA's decision must be judged based on the stark contrast between $4-6 *million* in annual benefits and $9.6 *billion* in annual costs. That Congress would have intended such an outcome is improbable, to say the least. *Brown & Williamson*, 529 U.S. at 133 (in construing statutes, "we must be guided to a degree by common sense as to the manner in which Congress is likely to delegate a policy decision of such economic and political magnitude to an administrative agency."); *Am. Tobacco Co. v. Patterson*, 456 U.S. 63, 71 (1982) ("Statutes should be interpreted to avoid ... unreasonable results whenever possible.").

II. EPA's Regulation of Acid Gases Demonstrates the Irrationality of EPA's Approach.

EPA's regulation of electric generator acid gas emissions is the definition of unreasonable agency decisionmaking. EPA is attempting to regulate

emissions that it cannot show are a risk to the public health or welfare in order to accomplish an objective that Congress did not authorize, while asserting a legal theory that would justify regulation for no reason.

A. As noted above, the Panel said that Section 7412(n)(1)(a)'s purpose was to allow EPA to "confirm the nature of public health hazards from EGU [electric generator] emissions." *White Stallion*, 748 F.3d at 1239, Pet. App. 29a. But neither the Utility Study, Utility Study, ES-23, Pet. App. 1937a, nor the only study that EPA performed thereafter of the health risks of electric generator acid gas emissions, 70 Fed. Reg. at 16,007, found any such risks. Indeed, EPA conceded in the regulatory preamble that acid gases do not create a cancer risk, 76 Fed. Reg. at 25,016, Pet. App. 1339a, and that "[o]ur case studies did not identify significant chronic non-cancer risks from acid gas emissions," *id.* The best EPA could do in the regulation was to express "concern[]" that acid gases in general are known to "contribute to chronic non-cancer toxicity," without making any finding that acid gases in the quantities emitted by generators pose a meaningful risk of doing so. *Id.*, Pet. App. 1339a.

Even EPA's findings as to possible environmental impacts of electric generator acid gas emissions lacked a substantive base. EPA's "evidence" of the environmental impacts of these emissions consists of EPA's general claim that "[i]n areas where the deposition of acids derived from emissions of sulfur and NO_x are causing aquatic and/or terrestrial acidification, with accompanying ecological impacts, the deposition of hydrochloric acid

could exacerbate these impacts." 76 Fed. Reg. at 25,050, Pet. App. 1482a-1483a (emphasis added). That may be true, but it does not prove—or even lead to an inference—that *electric generators* emit acid gases in sufficient amounts, given EPA's other regulations, to create a material environmental concern. The Utility Study did not conclude that electric generator acid gas emissions resulted in environmental harm, Utility Study at ES-23, Pet. App. 1937a-1939a, and EPA did not conduct any further study of possible environmental impacts of electric generator acid gas emissions.

The only further acid gas study that EPA relied on was one study of hydrochloric acid deposition in the United Kingdom, which EPA cites for the proposition that (a) hydrochloric acid is highly mobile in the environment, (b) hydrochloric acid can transport longer distances than previously thought, and (c) hydrochloric acid *can be* a larger driver of acidification than previously thought. 77 Fed. Reg. at 9,362, Pet. App. 457a-458a. EPA, however, did not even try to analyze the impact, if any, of *electric generator* emissions of hydrochloric acid in the United States and, as a result, could not point to even a single instance in which electric generator hydrochloric acid emissions have affected acid deposition anywhere or otherwise created an environmental impact.

Indeed, EPA simply ignored the requirement of Section 7412(n)(1)(A) that EPA determine whether it is "appropriate and necessary" to regulate electric generator acid gas emissions based on a study of the public health risk that these emissions pose "after imposition of the requirements of this Act." Sulfur

dioxide is stringently regulated under the NAAQS program. *Nat'l Envtl. Dev. Ass'n Clean Air Project v. EPA*, 686 F.3d 803 (D.C. Cir. 2012). EPA is required to set a secondary standard for SO_2 that protects the public welfare, 42 U.S.C. § 7409(b)(2), which includes protection against environmental harm, 42 U.S.C. § 7602(h). Moreover, the 1990 CAA Amendments specifically establish a program to control electric generator SO_2 emissions for the purpose of minimizing acid deposition. 42 U.S.C. §§ 7651-7651c. But EPA never determined that regulating electric generator acid gas emissions remains necessary in light of these programs. Indeed, EPA never examined in the rulemaking whether any areas of the United States are in nonattainment of EPA's secondary SO_2 NAAQS and, if so, whether electric generators were responsible.

EPA's failure to examine whether acid gas emissions actually pose a meaningful environmental risk given other regulation highlights the ultimate arbitrariness of EPA's approach here. Much of the cost of the regulation is driven by the need to control acid gases. 76 Fed. Reg. at 25,014, Pet. App. 1327a-1331a. Yet the only benefit that EPA can show from the expenditure of these costs (a reduction in atmospheric fine particle levels) is one that EPA cannot lawfully consider in this case. *State Farm*, 463 U.S. at 43 ("Normally, an agency rule would be arbitrary and capricious if the agency has relied on factors which Congress has not intended it to consider.").

B. EPA alternatively justified its regulation of electric generator acid gas emissions by claiming that the Act does not require it to find that those

emissions endanger the public health or environment in order for EPA to regulate them. 77 Fed. Reg. at 9,361, Pet. App. 452a-453a. Instead, EPA says it can piggyback on a public health or environmental hazard finding that it makes for another electric generator HAP. *Id.* Citing *Nat'l Lime Ass'n v. EPA*, 233 F.3d 625 (D.C. Cir. 2000), EPA stated that once it regulates *any* hazardous air pollutant emitted by electric generators under Section 7412, it must regulate all such pollutants. *Id.* The Panel agreed. *White Stallion*, 748 F.3d at 1244-45, Pet. App. 37a-41a.

Both EPA and the Panel, however, misread *National Lime*. In that case, the Court held that because EPA had a "clear statutory obligation to set emission standards for each listed HAP[,] ... the absence of technology-based pollution control devices for HCl, mercury, and total hydrocarbons did not excuse EPA from setting emission standards for those pollutants." *National Lime*, 233 F.3d at 634. But the issue in the present case for acid gases is not whether EPA can decline to adopt technology-based standards given the unavailability of control technology. The issue is the potential for hugely costly regulation of a substance that has not been appropriately found to pose a health or environmental danger.

More fundamentally, the court failed to account for the different regulatory structure in *National Lime* as compared with the present case. In *National Lime*, the court relied on the fact that Congress had listed all the hazardous pollutants that EPA regulated. *National Lime*, 233 F.3d at 634 (EPA must set emission standards "for each listed HAP"). Congress had thus predetermined that lime plant

HAP emissions presented a health danger, so long as EPA determined under Section 7412(c) that lime plants emitted HAPs in amounts exceeding the Congressionally-set thresholds, which it did. *Id.* at 629-30.

Congress cannot be said to have made that predetermination here. Although Congress listed all the pollutants that EPA regulated, it did not direct EPA to list electric generators under Section 7412(c), and to regulate them under Section 7412(d), if the Agency determined that generators emitted HAPs in amounts exceeding the statutory threshold. Instead, Congress specifically tasked EPA with undertaking the "Utility Study" to determine whether HAPs, as emitted by electric generators after compliance with other CAA regulation, posed a health hazard. Thus, Congress delegated to EPA the task of determining whether electric generator emissions of the listed pollutants were indeed hazardous and it directed EPA to regulate only if "appropriate and necessary." *Norwest Bank Minn. Nat'l Ass'n v. FDIC*, 312 F.3d 447, 451 (D.C. Cir. 2002) ("When both specific and general provisions cover the same subject, the specific provision will control.").

Moreover, regulation under Section 7412(n)(1)(A) is pollutant-specific. The study that Section 7412(n)(1)(A) requires as a precondition to regulation includes reporting on control strategies "for emissions which may warrant regulation under this section." Since Congress directed EPA to regulate based on the results of the study, Congress must have intended that EPA regulate emissions that warrant regulation and, logically enough, not regulate emissions that do not warrant regulation.

Hibbs v. Winn, 542 U.S. 88, 101 (2004) (statutory term must be given meaning in the context of the words around it); *Ali*, 552 U.S. at 222 (statutory terms should be construed to be "coherent and consistent").

Thus, the Panel is wrong in saying that "[t]he notion that EPA must 'pick and choose' among HAPs in order to regulate only those substances it deems *most harmful* is at odds with the court's precedent." *White Stallion*, 748 F.3d at 1245, Pet. App. 39a (emphasis added). It is not a question of some substances being more harmful than others; it is a question of whether EPA may regulate electric generator acid gas emissions without having to show that it is "appropriate" to regulate them by identifying a meaningful harm. Surely, given that Congress did not predetermine that these emissions create public health or environmental impacts and instead left that determination to EPA, the Agency cannot regulate unless it can show a meaningful impact. *See Coal. For Responsible Regulation v. EPA*, 684 F.3d 102, 135 (D.C. Cir. 2012) ("[i]t is absurd to think that Congress intended to subject stationary sources to the PSD permitting requirements due to emissions of substances that do not 'endanger the public health or welfare.'").

In sum, Congress directed EPA to regulate where "appropriate and necessary." Regulating substances that do not pose a health or environmental danger is neither appropriate nor necessary even if that regulation is inexpensive. But spending billions of dollars annually to regulate substances that have not been shown to be harmful is beyond inappropriate. It is irrational.

CONCLUSION

For the foregoing reason, the Court should grant this Petition for a Writ of Certiorari.

Respectfully submitted,

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July 14, 2014

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APPENDIX

APPENDIX A

UNITED STATES COURT OF APPEALS FOR THE DISTRICT OF COLUMBIA CIRCUIT

No. 12-1100

WHITE STALLION ENERGY CENTER, LLC,
Petitioner,

v.

ENVIRONMENTAL PROTECTION AGENCY,
Respondent;

AMERICAN ACADEMY OF PEDIATRICS, *et al.*,
Intervenors.

Consolidated with 12-1101, 12-1102, 12-1147, 12-1172, 12-1173, 12-1174, 12-1175, 12-1176, 12-1177, 12-1178, 12-1180, 12-1181, 12-1182, 12-1183, 12-1184, 12-1185, 12-1186, 12-1187, 12-1188, 12-1189, 12-1190, 12-1191, 12-1192, 12-1193, 12-1194, 12-1195, 12-1196

December 10, 2013, Argued
April 15, 2014, Decided

On Petitions for Review of Final Rule of the United States Environmental Protection Agency

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Wendy B. Jacobs, Adam Babich, and Michael A. Livermore were on the brief for amici curiae Institute for Policy Integrity, et al. in support of respondent.

JUDGES: Before: GARLAND, Chief Judge, and ROGERS and KAVANAUGH, Circuit Judges. KAVANAUGH, Circuit Judge, concurring in part and dissenting in part.

OPINION

PER CURIAM:* In 2012, the Environmental Protection Agency promulgated emission standards for a number of listed hazardous air pollutants emitted by coal- and oil-fired electric utility steam generating units. *See National Emission Standards for Hazardous Air Pollutants From Coal- and Oil-Fired Electric Utility Steam Generating Units and Standards of Performance for Fossil-Fuel-Fired Electric Utility, Industrial-Commercial-Institutional, and Small Industrial-Commercial-Institutional Steam Generating*

* Parts I, II, and IV are written by Judge Rogers. Part III is written by Judge Kavanaugh, as are his dissenting opinion in Part II.B.2 and his concurring opinion in Part IV.

Units, Final Rule, 77 Fed. Reg. 9304 (Feb. 16, 2012). In this complex case, we address the challenges to the Final Rule by State, Industry, and Labor petitioners, by Industry petitioners to specific aspects of the Final Rule, by Environmental petitioners, and by Julander Energy Company. For the following reasons, we deny the petitions challenging the Final Rule.

I.

In 1970, Congress enacted § 112 of the Clean Air Act, Pub. L. No. 91-604, § 4(a), 84 Stat. 1676, 1685 (1970), to reduce hazardous air pollutants ("HAPs"). *See Sierra Club v. EPA*, 353 F.3d 976, 979, 359 U.S. App. D.C. 251 (D.C. Cir. 2004); H. R. REP. NO. 101-490, at 150 (1990). The statute defined HAPs as "air pollutant[s] . . . which in the judgment of the Administrator [of the Environmental Protection Agency ("EPA")] cause, or contribute to, air pollution which may reasonably be anticipated to result in an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness." § 112(a)(1), 84 Stat. at 1685. In its original form, § 112 required EPA to publish a list containing "each hazardous air pollutant for which [it] intends to establish an emission standard." § 112(b)(1)(A), 84 Stat. at 1685. EPA then was to promulgate, within 360 days, emission standards "provid[ing] an ample margin of safety to protect the public health" for each listed HAP, unless EPA found that a particular listed substance was in fact not hazardous. § 112(b)(1)(B), 84 Stat. at 1685. Over the next eighteen years, EPA listed only eight HAPs, established standards for only seven, and as to these seven addressed only a limited selection of possible pollution sources. *See New Jersey v. EPA*, 517 F.3d 574, 578, 380 U.S. App. D.C. 134 (D.C. Cir. 2008); S. REP. NO. 101-228, at 131 (1989).

To remedy the slow pace of EPA's regulation of HAPs, Congress amended the Clean Air Act in 1990, *see* Pub. L. No. 101-549, 104 Stat. 2531 (1990) ("CAA"), by eliminating much of EPA's discretion in the process. *See New Jersey*, *517 F.3d at 578*. In the amended § 112, Congress itself listed 189 HAPs that were to be regulated, *see* CAA § 112(b), *42 U.S.C. § 7412(b)*, and directed EPA to publish a list of "categories and subcategories" of "major sources" and certain "area sources" that emit these pollutants, CAA § 112(c), *42 U.S.C. § 7412(c)*. Once listed, a source category may only be delisted (with one exception not relevant here) if EPA determines that "no source" in that category emits HAPs in quantities exceeding specified thresholds. CAA § 112(c)(9)(B), *42 U.S.C. § 7412(c)(9)(B)*. For each listed "category or subcategory of major sources and area sources" of HAPs, EPA must promulgate emission standards. CAA § 112(d)(1), *42 U.S.C. § 7412(d)(1)*. Section 112(d) provides, as relevant, that emission standards

> shall require the *maximum degree of reduction in emissions* of the hazardous air pollutants subject to this section (including a prohibition on such emissions, where achievable) that the Administrator, taking into consideration the cost of achieving such emission reduction, and any non-air quality health and environmental impacts and energy requirements, determines is achievable[.]

CAA § 112(d)(2), 42 U.S.C. § 7412(d)(2) (emphasis added). For existing sources, these "maximum achievable control technology" ("MACT") standards may not be less stringent — regardless of cost or other considerations — "than [] the average emission limitation achieved by the best performing [] sources"

in the relevant category or subcategory. CAA § 112(d)(3)(A)-(B), 42 U.S.C. § 7412(d)(3)(A)-(B); *see Nat'l Lime Ass'n v. EPA*, 233 F.3d 625, 629, 344 U.S. App. D.C. 97 (D.C. Cir. 2000). EPA refers to minimum-stringency MACT standards as "floors." Standards more stringent than the floors, determined pursuant to § 112(d)(2), are called "beyond-the-floor" limits.

For electric utility steam generating units ("EGUs"), however, Congress directed that prior to any listing EPA conduct a study of "the *hazards to public health* reasonably anticipated to occur as a result of [EGU HAP emissions] after imposition of the requirements of this Chapter [i.e., Chapter 85 Air Pollution Prevention and Control]." CAA § 112(n)(1)(A), *42 U.S.C. § 7412(n)(1)(A)* (emphasis added). The results of this "Utility Study" were to be reported to Congress within three years. *Id.* Further, Congress directed that:

> The Administrator shall regulate [EGUs] under this section, if the Administrator finds such regulation is *appropriate and necessary* after considering the results of the study required by this subparagraph.

Id. (emphasis added). Congress also directed EPA to conduct two other studies on mercury emissions: the "Mercury Study" on "the rate and mass of such emissions, the health and environmental effects of such emissions, technologies which are available to control such emissions, and the costs of such technologies," to be reported to Congress in four years, and the National Institute of Environmental Health Sciences "study to determine the threshold level of mercury exposure below which adverse human health effects are not expected to occur," to be

reported to Congress in three years. *See* CAA § 112(n)(1)(A)-(C), 42 U.S.C. § 7412(n)(1)(A)-(C).

In December 2000, on the basis of the Utility Study and other data subsequently gathered, EPA issued a notice of regulatory finding "that regulation of HAP emissions from coal-and oil-fired electric utility steam generating units under section 112 of the CAA is appropriate and necessary." *Regulatory Finding on the Emissions of Hazardous Air Pollutants From Electric Utility Steam Generating Units,* 65 Fed. Reg. 79,825, 79,826 (Dec. 20, 2000) ("2000 Finding"). EPA found that EGUs "are the largest source of mercury emissions in the U.S." and that "[m]ercury is highly toxic, persistent, and bioaccumulates in food chains." 65 Fed. Reg. at 79,827. Specifically, "[m]ercury emitted from [EGUs] . . . is transported through the atmosphere and eventually deposits onto land or water bodies" where it then changes into "a highly toxic" substance called methylmercury. *Id.* Methylmercury "biomagnifies in the aquatic food chain," *id.*, meaning that it becomes concentrated in the bodies of predatory fish which absorb the methylmercury their food sources contained. When humans eat these contaminated fish, they also are exposed; the methylmercury from the fish is absorbed into the bloodstream and "distributed to all tissues including the brain." *Id.* at 79,829. The risks are greatest for women of childbearing age, EPA explained, because methylmercury "readily passes . . . to the fetus and fetal brain," *id.*, and "the developing fetus is most sensitive to the effects of methylmercury," *id.* at 79,827. Children born to women who were exposed to methylmercury during pregnancy have exhibited neurological abnormalities and developmental delays. *Id.* at 79,829.

EPA concluded that "the available information indicate[d] that mercury emissions from [EGUs] . . . are a threat to public health and the environment," notwithstanding "uncertainties regarding the *extent* of the risks due to electric utility mercury emissions." *Id.* (emphasis added). EPA also identified several other metal and acid gas emissions from EGUs that were "of potential concern," namely arsenic, chromium, nickel, cadmium, dioxins, hydrogen chloride, and hydrogen fluoride. *Id.* EPA therefore determined that it was "appropriate" to regulate coal-and oil-fired EGUs under § 112 because of the health and environmental hazards posed by mercury emissions from EGUs, and the availability of a number of control options to effectively reduce such emissions. *Id. at 79,830.* EPA further determined that it was "necessary" to regulate EGUs under § 112 because implementation of other provisions of the CAA would "not adequately address" the public health and environmental hazards found. *Id.* Therefore, EPA added "coal- and oil-fired electric utility steam generating units to the list of source categories under section 112(c) of the CAA." *Id.*

In 2005, EPA reversed its 2000 Finding and removed coal-and oil-fired EGUs from the list of source categories under § 112(c). *See Revision of December 2000 Regulatory Finding on the Emissions of Hazardous Air Pollutants From Electric Utility Steam Generating Units and the Removal of Coal- and Oil-Fired Electric Utility Steam Generating Units From the Section 112(c) List,* 70 Fed. Reg. 15,994, 15,994 (Mar. 29, 2005) ("2005 Delisting Decision"). This change was based on EPA's revised interpretation of § 112(n)(1)(A) and, to some extent, on a revised assessment of the results of the Utility Study. EPA concluded that it lacked authority under

§ 112(n)(1)(A) to regulate on the basis of non-health hazards (e.g., environmental harms), and should "focus solely" on the health effects directly attributable to EGU emissions, rather than on EGUs' contribution to overall pollutant levels. *Id.* at 15,998. Further, EPA decided it could consider other relevant, "situation-specific factors, including cost" that may affect whether regulation under § 112 is "appropriate." *Id.* at 16,000-01. Critically, EPA determined that it must make its "appropriate and necessary" finding by reference to health hazards that will remain "*after* imposition of the requirements of" the CAA. *Id.* at 15,998 (emphasis added) (quoting CAA § 112(n)(1)(A), 42 U.S.C. § 7412(n)(1)(A)). EPA interpreted these other "requirements" to include "not only those requirements already imposed and in effect, but also those requirements that EPA reasonably anticipates will be implemented" and which "could either directly or indirectly result in reductions of utility HAP emissions." *Id.* at 15,999. Concluding that regulation under other provisions of the CAA would adequately address EGU emissions of mercury and other HAPs, EPA determined that regulation under § 112 was neither "appropriate" nor "necessary." *Id.* at 16,002-08. In responding to comments, EPA stated that if it *were* to regulate EGU emissions, then it would regulate *only* those substances for which it had made a specific "appropriate and necessary" determination. States and other groups petitioned for review and this court vacated the 2005 Listing Decision, *New Jersey,* 517 F.3d at 583, holding that EPA's attempt to reverse its December 2000 listing decision was unlawful because Congress had "unambiguously limit[ed] EPA's discretion to remove sources, including EGUs, from the section 112(c)(1) list once they have been added to it."

In 2012, after notice and comment, EPA "confirm[ed]" its 2000 Finding that regulation of EGU emissions under § 112 is "appropriate and necessary." Final Rule, 77 Fed. Reg. 9304, 9310-11. In the proposed rule, EPA stated that "the December 2000 Finding was valid at the time it was made based on the information available to the Agency at that time." Proposed Rule, 76 Fed. Reg. 24,976, 24,986, 24,994-97 (May 3, 2011) ("NPRM"). Although of the view that no further evidence was required to affirm the 2000 Finding, EPA had conducted additional quantitative and qualitative analyses "confirm[ing] that it remains appropriate and necessary today to regulate EGUs under CAA section 112." *Id.* at 24,986; *see id.* at 24,999-25,020. With respect to the term "appropriate," EPA explained that it was "chang[ing] the position taken in 2005 that the appropriate finding could not be based on environmental effects alone"; "revisiting the 2005 interpretation that required the Agency to consider HAP emissions from EGUs without considering the cumulative impacts of all sources of HAP emissions"; "revising the 2005 interpretation that required the Agency to evaluate the hazards to public health after imposition of the requirements of the CAA"; and "rejecting the 2005 interpretation that authorizes the Agency to consider other factors (*e.g.*, cost), even if the agency determines that HAP emitted by EGUs pose a hazard to public health (or the environment)." *Id.* at 24,989. With respect to the term "necessary," EPA rejected as "unreasonable" its interpretation in 2005 that regulation under § 112 was "necessary" only if *no* other provision in the CAA — whether implemented or only anticipated — could "directly or indirectly" reduce HAP emissions to acceptable levels. *Id.* at 24,992.

EPA explained that it interpreted § 112(n)(1)(A)

> to require the Agency to find it *appropriate* to regulate EGUs under CAA section 112 if the Agency determines that the emissions of one or more HAP emitted from EGUs pose an identified or potential hazard to public health or the environment at the time the finding is made. If the Agency finds that it is *appropriate* to regulate, it must find it *necessary* to regulate EGUs under section 112 if the identified or potential hazards to public health or the environment will not be adequately addressed by the imposition of the requirements of the CAA. Moreover, it may be *necessary* to regulate utilities under section 112 for a number of other reasons, including, for example, that section 112 standards will assure permanent reductions in EGU HAP emissions, which cannot be assured based on other requirements of the CAA.

Id. at 24,987-88. EPA also affirmed that coal- and oil-fired EGUs were properly listed as a source category under § 112(c). *See id. at 24,986*. EPA adhered to these interpretations in the *Final Rule, 77 Fed. Reg. at 9311*. Accordingly, on February 16, 2012, EPA promulgated emission standards for a number of listed HAPs emitted by coal- and oil-fired EGUs. *See id.* at 9487-93.

Several petitions for review challenge the Final Rule. We first address, in Part II, the challenges of the State, Industry, and Labor petitioners. In Part III, we address Industry petitioners' specific issues. In Part IV.A, we address the challenges by the Environmental petitioners, and in Part IV.B, Julander Energy Company's standing. In addressing the substantive challenges to the Final Rule, this court must

determine under the CAA whether the Final Rule was promulgated in a manner that was arbitrary or capricious, an abuse of discretion, or otherwise not in accordance with law. *See* CAA § 307(d)(9)(A), 42 U.S.C. § 7607(d)(9)(A). "The 'arbitrary and capricious' standard deems the agency action presumptively valid provided the action meets a minimum rationality standard." *Sierra Club*, 353 F.3d at 978-79 (quoting *Natural Res. Def. Council v. EPA*, 194 F.3d 130, 136, 338 U.S. App. D.C. 340 (D.C. Cir. 1999)). That is, "[i]f EPA acted within its delegated statutory authority, considered all of the relevant factors, and demonstrated a reasonable connection between the facts on the record and its decision, we will uphold its determination." *Ethyl Corp. v. EPA*, 51 F.3d 1053, 1064, 311 U.S. App. D.C. 163 (D.C. Cir. 1995). The court will show particular deference "where the agency's decision rests on an evaluation of complex scientific data within the agency's technical expertise." *Troy Corp. v. Browner*, 120 F.3d 277, 283, 326 U.S. App. D.C. 249 (D.C. Cir. 1997); *see also Marsh v. Or. Natural Res. Council*, 490 U.S. 360, 377, 109 S. Ct. 1851, 104 L. Ed. 2d 377 (1989).

II.

State, Industry, and Labor petitioners challenge EPA's interpretation and application of the "appropriate and necessary" requirement in § 112(n)(1)(A).

A.

As a threshold matter, petitioners contend that the 2000 Finding was unlawful because EPA did not allow notice and comment on the finding, did not quantify the relevant mercury emissions and associated health risks, and did not describe "alternative control strategies" as required under § 112(n)(1)(A).

Because the December 2000 notice was "fundamentally flawed," they contend it "could have no legal consequences" and "could not provide the basis for a § 112(c) listing decision." State, Industry & Labor Pet'rs' Br. (hereinafter "SIL Br.") 27-28. Without a proper listing under § 112(c), they contend, EPA has no authority to regulate EGUs under § 112(d).

The court need not decide whether EPA's December 2000 "appropriate and necessary" finding was procedurally or substantively valid because EPA reconsidered and "confirm[ed]" that determination in the Final Rule. *See* NPRM, 76 Fed. Reg. at 24,977; Final Rule, 77 Fed. Reg. at 9310-11, 9320. For the reasons we will discuss, we hold that EPA's finding in the Final Rule was substantively and procedurally valid, and consequently any purported defects in the 2000 Finding have been cured, rendering petitioners' challenge to December 2000 "appropriate and necessary" finding moot. *Cf. Fund for Animals, Inc. v. Hogan*, 428 F.3d 1059, 1063-64, 368 U.S. App. D.C. 238 (D.C. Cir. 2005).

B.

The crux of petitioners' challenge to the Final Rule focuses on EPA's interpretation of the phrase "appropriate and necessary" in § 112(n)(1)(A), 42 U.S.C. § 7412(n)(1)(A). The context of this phrase is as follows. In a special subsection on EGUs, Congress first directed: "The Administrator shall perform a *study of the hazards to public health* reasonably anticipated to occur as a result of emissions by electric utility steam generating units of pollutants listed under subsection (f) after imposition of the requirements of this Act." CAA § 112(n)(1)(A), 42 U.S.C. § 7412(n)(1)(A) (emphasis added). Congress then directed: "The Administrator shall regulate

electric utility steam generating units under this section, if the Administrator finds such regulation is *appropriate and necessary after considering the results of the study* required by this subparagraph." *Id.* (emphasis added). Apart from the instruction to "consider[] the results of the [Utility Study]" on public health hazards from EGU emissions, the statute offers no express guidance regarding what factors EPA is required or permitted to consider in deciding whether regulation under § 112 is "appropriate and necessary." Neither does it define the words "appropriate" or "necessary." *See* NPRM, 76 Fed. Reg. at 24,986; 2005 Listing Decision, 70 Fed. Reg. at 15,997. Petitioners object to how EPA chose to fill these gaps.

In matters of statutory interpretation, the court applies the familiar two part test under *Chevron U.S.A., Inc. v. Natural Resources Defense Council, Inc.*, 467 U.S. 837, 842-43, 104 S. Ct. 2778, 81 L. Ed. 2d 694 (1984). First, the court employs traditional tools of statutory construction to determine *de novo* "whether Congress has directly spoken to the precise question at issue." *Id.* at 842, 843 n.9. If the court "ascertains that Congress had an intention on the precise question at issue," *id.* at 843 n.9, "that is the end of the matter" and the court "must give effect to the unambiguously expressed intent of Congress," *id.* at 842-43. If, however, "the statute is silent or ambiguous with respect to the specific issue," the court will uphold the agency's interpretation so long as it constitutes "a permissible construction of the statute." *Id.* at 843. "In such case, a court may not substitute its own construction of a statutory provision for a reasonable interpretation made by the administrator of an agency." *Id.* at 844.

To the extent petitioners' challenge concerns EPA's *change* in interpretation from that in 2005, our approach is the same because "[a]gency inconsistency is not a basis for declining to analyze the agency's interpretation under the *Chevron* framework." *Nat'l Cable & Telecomms. Ass'n v. Brand X Internet Servs.*, 545 U.S. 967, 981, 125 S. Ct. 2688, 162 L. Ed. 2d 820 (2005). That is, "if the agency adequately explains the reasons for a reversal of policy, change is not invalidating, since the whole point of *Chevron* is to leave the discretion provided by the ambiguities of a statute with the implementing agency." *Id.* (internal quotation marks omitted). And while "[u]nexplained inconsistency" may be "a reason for holding an interpretation to be an arbitrary and capricious change from agency practice," *id.*, our review of a change in agency policy is no stricter than our review of an initial agency action, *see FCC v. Fox Television Stations, Inc.*, 556 U.S. 502, 514-16, 129 S. Ct. 1800, 173 L. Ed. 2d 738 (2009). Thus, although an agency may not "depart from a prior policy *sub silentio* or simply disregard rules that are still on the books," the agency "need not demonstrate to a court's satisfaction that the reasons for the new policy are *better* than the reasons for the old one." *Id.* at 515. Rather, "it suffices that the new policy is permissible under the statute, that there are good reasons for it, and that the agency *believes* it to be better." *Id.*

1. *Reliance on delisting criteria*. In the Final Rule, EPA concluded that it is "appropriate and necessary" to regulate HAP emissions on the basis, *inter alia*, that EGU emissions of certain HAPs pose a cancer risk higher than the standard set forth in the § 112(c)(9) delisting criteria (i.e., greater than one in a million for the most exposed individual). *See* Final Rule, 77 Fed. Reg. at 9311; NPRM, 76 Fed. Reg. at

24,998. Petitioners contend that by so doing EPA wrongly conflated the delisting criteria with the "appropriate and necessary" determination. "By applying the *delisting* provisions of § 112(c)(9) in making the initial, *pre-listing* determination whether it is 'appropriate and necessary' to regulate EGUs, EPA has unlawfully imposed requirements on itself the Congress chose not to impose at the listing stage." SIL Br. 35. They maintain that EPA's approach "would treat EGUs the same as all other major source categories — as a category that *must* be listed *unless* the delisting criteria are met." *Id.*

EPA explained that it was relying upon the delisting criteria to interpret an ambiguous term in § 112(n)(1)(A), namely, "hazards to public health," *see* Final Rule, 77 Fed. Reg. at 9333-34; NPRM, 76 Fed. Reg. at 24,992-93, because the phrase "hazards to public health" is nowhere defined in the CAA. EPA looked to the delisting criteria, which specify the risk thresholds below which a source category need not be regulated, as evidence of congressional judgment as to what *degree* of risk constitutes a health hazard. *See id.* EPA explained:

> Although Congress provided no definition of *hazard to public health*, section 112(c)(9)(B) is instructive. In that section, Congress set forth a test for removing source categories from the section 112(c) source category list. That test is relevant because it reflects Congress' view as to the level of health effects associated with HAP emissions that Congress thought warranted continued regulation under section 112.

NPRM, 76 Fed. Reg. at 24,993 (emphasis added); *see* Final Rule, *77 Fed. Reg. at 9333-34*. EPA concluded that it had discretion also to consider various other

factors in evaluating hazards to public health, including

> the nature and severity of the health effects associated with exposure to HAP emissions; the degree of confidence in our knowledge of those health effects; the size and characteristics of the populations affected by exposures to HAP emissions; [and] the magnitude and breadth of the exposures and risks posed by HAP emissions from a particular source category, including how those exposures contribute to risk in populations with additional exposures to HAP from other sources[.]

NPRM, 76 Fed. Reg. at 24,992; *see* Final Rule, 77 Fed. Reg. at 9334.

EPA reasonably relied on the § 112(c)(9) delisting criteria to inform its interpretation of the undefined statutory term "hazard to public health." Congress did not specify what types or levels of public health risks should be deemed a "hazard" for purposes of § 112(n)(1)(A). By leaving this gap in the statute, Congress delegated to EPA the authority to give reasonable meaning to the term. *Cf. Chevron,* 467 U.S. at 843-44. EPA's approach does not, as petitioners contend, "treat EGUs the same as all other major source categories." SIL Br. 35. Other major source categories *must* be listed unless the delisting criteria are satisfied; EPA's approach treats EGUs quite differently. For EGUs, EPA reasonably determined that it may look at a broad range of factors — only one of which concerned the § 112(c)(9) benchmark levels — in assessing the health hazards posed by EGU HAPs. Nowhere does EPA state or imply that the delisting criteria provide the sole basis for determining whether it is "appropriate and

necessary" to regulate EGUs under § 112. Because EPA's approach is based on a permissible construction of § 112(n)(1)(A), it is entitled to deference and must be upheld.

2. *Costs of regulation*. Noting that in 2005 EPA construed § 112(n)(1)(A) to allow consideration of costs in determining whether regulation of EGU HAP emissions is "appropriate," petitioners contend that EPA's new interpretation to "preclude consideration of costs," SIL Br. 42, "unreasonably constrains the language of § 112(n)(1)(A)," SIL Br. 39. They point to the dictionary definition of "appropriate" and to the differences between regulation of EGUs under § 112(n)(1)(A) and regulating other sources under § 112(c), and to this court's precedent that "only where there is 'clear congressional intent to preclude consideration of cost' [do] we find agencies barred from considering costs." SIL Br. 40 (quoting *Michigan v. EPA*, 213 F.3d 663, 678, 341 U.S. App. D.C. 306 (D.C. Cir. 2000), *cert. denied*, *532* U.S. 904, 121 S. Ct. 1225, 149 L. Ed. 2d 135 (2001)). They contend that EPA's new interpretation "is also unlawful because it eliminates the discretion that Congress intended EPA to exercise after completing the Utility Study." SIL Br. 41. As they see it, if the statutory term "appropriate" imposes any limit whatsoever, it must at least limit regulation to "risks [that] are worth the cost of elimination." SIL Reply Br. 14 (quoting *Michigan v. EPA*, 213 F.3d at 667 (addressing the term "significant")).

In the Final Rule, EPA stated that "it is reasonable to make the listing decision, including the appropriate determination, without considering costs." Final Rule, 77 Fed. Reg. at 9327. EPA reasoned that § 112(n)(1)(A) would have included an "express

statutory requirement that the Agency consider costs in making the appropriate determination" if Congress wanted to require EPA to do so. *Id.* EPA also noted that "[t]o the extent [its] interpretation differs from the one set forth in 2005," it had "fully explained the basis for such changes." *Id.* at 9323 (citing NPRM, 76 Fed. Reg. at 24,986-93). (Even in 2005, EPA noted only that "[n]othing precludes EPA from considering costs in assessing whether regulation of [EGUs] under section 112 is appropriate in light of all the facts and circumstances presented." 2005 Delisting Decision, 70 Fed. Reg. at 16,001 n.19.) In responding to comments reacting to its position that "the better reading of the term 'appropriate' is that it does not allow for the consideration of costs in assessing whether hazards to public health or the environment are reasonably anticipated to occur based on EGU emissions," NPRM, 76 Fed. Reg. at 24,989, EPA observed that the dictionary definition of "appropriate" does not require consideration of costs and that commenters had failed to identify an express statutory requirement to that effect. EPA also stated that it was reasonable to decline to consider costs in the absence of an express statutory requirement to do so because Congress, in enacting § 112, was principally concerned with mitigating hazards to public health and the environment from HAP emissions. *See* Final Rule, 77 Fed. Reg. at 9327. Inasmuch as Congress had treated the regulation of HAP emissions differently in the 1990 Amendments because EPA was not acting quickly enough, EPA concluded it was reasonable to make a listing decision without considering costs. *See id.*

On its face, § 112(n)(1)(A) neither requires EPA to consider costs nor prohibits EPA from doing so. Indeed, the word "costs" appears nowhere in

subparagraph A. In the absence of any express statutory instruction regarding costs, petitioners rely on the dictionary definition of "appropriate" — meaning "especially suitable or compatible" or "suitable or proper in the circumstances" — to argue that EPA was required "to take into account costs to the nation's electricity generators when deciding whether to regulate EGUs." SIL Br. 39 (citing MERRIAM-WEBSTER'S ONLINE DICTIONARY; NEW OXFORD AMERICAN DICTIONARY (2d ed. 2005)). Yet these definitions, which do not mention costs, merely underscore that the term "appropriate" is "open-ended," "ambiguous," and "inherently context-dependent." *Sossamon v. Texas*, 131 S. Ct. 1651, 1659, 179 L. Ed. 2d 700 (2011); *cf. Nat'l Ass'n of Clean Air Agencies v. EPA*, 489 F.3d 1221, 1229, 376 U.S. App. D.C. 385 (D.C. Cir. 2007).

Even if the word "appropriate" might require cost consideration in *some* contexts, such a reading of "appropriate" is unwarranted here, where Congress directed EPA's attention to the conclusions of the study regarding public health hazards from EGU emissions. Throughout § 112, Congress mentioned costs explicitly where it intended EPA to consider them. *Cf.* CAA § 112(d)(2), 112(d)(8)(A)(i), 112(f)(1)(B), 112(f)(2)(A), 112(n)(1)(B), 112(s)(2), 42 U.S.C. § 7412(d)(2), 7412(d)(8)(A)(i), 7412(f)(1)(B), 7412(f)(2)(A), 7412(n)(1)(B), 7412(s)(2). Indeed, in the immediately following subparagraph of § 112(n), Congress expressly required costs to be considered. CAA § 112(n)(1)(B), 42 U.S.C. § 7412(n)(1)(B). The contrast with subparagraph A could not be more stark. "Where Congress includes particular language in one section of a statute but omits it in another section of the same Act, it is generally presumed that Congress acts intentionally . . . in the disparate inclusion or

exclusion." *Russello v. United States*, 464 U.S. 16, 23, 104 S. Ct. 296, 78 L. Ed. 2d 17 (1983) (alterations omitted); *cf. Catawba Cnty., N.C. v. EPA*, 571 F.3d 20, 36, 387 U.S. App. D.C. 20 (D.C. Cir. 2009). Petitioners offer no compelling reason why Congress, by using only the broad term "appropriate," would have intended the same result — that costs be considered — in § 112(n)(1)(A). The legislative history the dissent claims "establishes" the point, Dissent at 13, consists of a Floor statement by a single Congressman that at best is ambiguous.[1] For these reasons, we conclude that the statute does not evince unambiguous congressional intent on the specific issue of whether EPA was required to consider costs in making its "appropriate and necessary" determination under § 112(n)(1)(A).

Turning to EPA's approach, its position that "nothing about the definition of ['appropriate'] compels a consideration of costs," Final Rule, 77 Fed. Reg. at 9327, is clearly permissible. In *Whitman v. American Trucking Ass'ns,* 531 U.S. 457, 121 S. Ct. 903, 149 L. Ed. 2d 1 (2001), Justice Scalia, writing for a unanimous Court, noted that the Supreme Court has "refused to find implicit in ambiguous sections of the CAA an authorization to consider costs that has elsewhere, and so often, been expressly granted." *Id.* at 467; *see also Natural Res. Def. Council v. U.S. EPA*, 824 F.2d 1146, 1163-65, 263 U.S. App. D.C. 166

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[1] *See* 1 A LEGISLATIVE HISTORY OF THE CLEAN AIR ACT AMENDMENTS OF 1990, at 1416-17 (1993) (statement by Rep. Oxley) (indicating that the provision authorizing regulation of EGUs would "avoid[] the imposition of excessive and unnecessary costs" *by ensuring that* EPA can regulate "only if the studies described in section 112(n) clearly establish that emissions . . . from such units cause a significant risk of serious adverse effects on public health").

(D.C. Cir. 1987) (en banc). EPA's interpretation is consistent with that instruction. Just as in *Whitman*, EPA declines to find in an ambiguous section what in so many other CAA sections Congress has mentioned expressly. And even assuming *Whitman* might be distinguished on grounds it concerned a different provision of the CAA, the question remains only whether EPA's interpretation is *permissible*. Petitioners cannot point to a single case in which this court has *required* EPA to consider costs where the CAA does not expressly so instruct. In *Michigan v. EPA*, this court merely held that "the agency was *free* to consider . . . costs" under CAA § 110(a)(2)(D), *42 U.S.C.* § 7410(a)(2)(D), as EPA had urged in that case. 213 F.3d at 679 (emphasis added).

EPA's interpretation is also consistent with the purpose of the 1990 Amendments, which were aimed at remedying "the slow pace of EPA's regulation of HAPs" following the initial passage of the CAA. *New Jersey*, 517 F.3d at 578. To ensure that HAP emissions would be reduced to at least minimally-acceptable levels, Congress, among other things, listed 189 HAP substances for regulation and "restrict[ed] the opportunities for EPA and others to intervene in the regulation of HAP sources." *Id.* The overall purpose of the 1990 Amendments was to spur EPA to action. Although Congress gave EGUs a three-year pass when it instructed EPA to conduct a further study before regulating EGUs, *see* CAA § 112(n)(1)(A), 42 U.S.C. § 7412(n)(1)(A), there is no indication that Congress did *not* intend EPA to regulate EGUs if and when their public health hazards were confirmed by the study, as they were here.

Petitioners, and our dissenting colleague, suggest that EPA's interpretation is unreasonable because the notion that Congress would have authorized EPA to regulate without *any* consideration of regulatory costs is implausible. But this argument rests on a false premise. Here, as in *Whitman*, interpreting one isolated provision not to require cost consideration does not indicate that Congress was unconcerned with costs altogether, because Congress accounted for costs elsewhere in the statute. Section 112(d)(2) expressly requires EPA to "tak[e] into consideration the cost of achieving . . . emission reduction[s]" when setting the *level* of regulation under § 112. CAA § 112(d)(2), 42 U.S.C. § 7412(d)(2). It is true that this cost consideration requirement does not apply with respect to MACT floors. Yet even for MACT floors, costs are reflected to some extent because the floors correspond (by definition) to standards that better-performing EGUs have *already achieved*, presumably in a cost efficient manner. *See* CAA § 112(d)(3)(A), 42 U.S.C. § 7412(d)(3)(A). Moreover, Industry respondent intervenors point out that petitioners' proposed approach would lead to an improbable "all-or-nothing" scheme in which EPA could "choose not to regulate EGUs *at all* under Section 112 based on cost, even though EPA could not consider cost to justify a less stringent emission standard than the MACT floor." Indus. Resp't Intvn'rs' Br. 8.

Contrary to petitioners' claims, the word "appropriate" is not rendered meaningless unless interpreted to include cost consideration. Petitioners contend that § 112(n)(1)(A) mandates a two-step inquiry: EPA must "*first* identify 'a health hazard' from HAPs emitted from EGUs, and *then* determine whether regulation of that health hazard is 'appropriate and necessary.'" SIL Br. 41 (emphasis added). If the

existence of a health hazard automatically *means* regulation is appropriate, they contend, then EPA has unlawfully abdicated the exercise of discretion Congress delegated to it. This argument, too, is unpersuasive. First, the rulemaking record reflects that EPA did *not* focus exclusively on health hazards in considering whether regulation would be "appropriate"; EPA also considered "the availability of controls to address HAP emissions from EGUs." NPRM, 76 Fed. Reg. at 24,989; *see id.* at 24,997; *see also* Final Rule, 77 Fed. Reg. at 9311. The factual premise of petitioners' argument is therefore incorrect. Second, even if EPA *had* focused exclusively on health hazards, the word "appropriate" would still have meaning in § 112(n)(1)(A) because the provision does not assume, as petitioners seem to suggest, that EPA would in fact "identify 'a health hazard'" from EGUs. SIL Br. 41. Rather, the statute directs EPA to "*perform a study* of the hazards to public health *reasonably anticipated* to occur" and then to "regulate [EGUs] . . . if the Administrator finds such regulation is appropriate and necessary after *considering the results of the study*." CAA § 112(n)(1)(A), 42 U.S.C. § 7412(n)(1)(A) (emphasis added). At the time Congress enacted the 1990 Amendments, it was possible that the Utility Study would fail to identify significant health hazards from EGU HAP emissions. (Indeed, petitioners argue that it *did* fail to do so. *See* SIL Br. 13, 48-54.) Therefore, EPA had to "consider[] the results of the study" in order to determine whether regulation would be "appropriate" based on its assessment of the existence and severity of such health hazards. The term "appropriate" plainly plays a role: it requires EPA to apply its judgment in evaluating the results of the study.

Basically, petitioners and our dissenting colleague seek to impose a requirement that Congress did not. What they ignore is that Congress sought, as a threshold matter, to have EPA confirm the nature of public health hazards from EGU emissions. That is the clear focus of § 112(n)(1)(A). After that, Congress left it to the expertise and judgment of EPA whether or not to regulate. For EPA to focus its "appropriate and necessary" determination on factors relating to public health hazards, and not industry's objections that emission controls are costly, properly puts the horse before the cart, and not the other way around as petitioners and our dissenting colleague urge. Given Congress's efforts in the 1990 Amendments to promote regulation of hazardous pollutants, EPA's interpretation of § 112(n)(1)(A) appears consistent with Congress's intent. Recall that only EGUs' hazardous emissions were relieved of regulation until completion of a study, and once the study confirmed the serious public health effects of hazardous pollutants from EGUs, Congress gave no signal that the matter should end if remediation would be costly.

Our dissenting colleague has written a powerful-sounding dissent. It sounds powerful, however, only because it elides the distinction between EPA's initial decision regarding whether to list EGUs as sources of hazardous air pollutants, and its subsequent decision regarding whether to issue stringent beyond-the-floor standards for such sources. The dissent refers to both together as the MACT "program." Dissent at 3. But the "program" in fact proceeds in two stages, as the dissent acknowledges. It is only as to the first, listing stage that EPA has determined it should not consider costs. That stage leads only to the setting of the statutory MACT floor which, as the dissent notes, is a "minimum stringency level." *Id.* The second stage

leads to beyond-the-floor standards, which are more restrictive. When setting those, EPA *does* consider costs.

The dissent contends that "[m]eeting that [MACT] floor will be prohibitively expensive, particularly for many coal-fired utilities," forcing them "out of business." Dissent at 10-11. But in the Final Rule EPA rejected this contention, concluding that "the estimated number of early retirements," of EGUs "that may result from this rule is . . . less than 2 percent of all U.S. coal-fired capacity" in 2015. Final Rule, 77 Fed. Reg. at 9416; *see also id.* at 9408 (rejecting the claim that the Final Rule "will result in substantial power plant retirements"). Petitioners have not challenged that conclusion. Industry respondent intervenors further observe that continuing to exempt EGUs from HAP regulation penalizes those plants that *have* made investments in clean air technology, and that "[t]he Rule merely requires owners of uncontrolled plants to install and operate control technology already operating at their competitors' plants, both leveling the playing field and improving health and the environment." Indus. Resp't Intv'nrs' Br. 7. The Final Rule, which, as the dissent notes, EPA has calculated will cost $9.6 billion a year, includes the cost of both stages. EPA also has concluded under Executive Order 13563 that the annualized benefits are $37 to $90 billion. *See Final Rule, 77 Fed. Reg. at 9306.* (The dissent questions this conclusion, notwithstanding its promise that agency cost-benefit analyses should be reviewed deferentially.) That's "billion with a b," in the dissent's catchy phrase. Dissent at 1. In short, "the benefits of this rule outweigh its costs by between 3 to 1 or 9 to 1." *Final Rule, 77 Fed. Reg. at 9306.*

As the agency noted, "[u]nder section 112(n)(1)(A), EPA is evaluating whether to regulate HAP emissions from EGUs *at all*." NPRM, 76 Fed. Reg. at 24,989 (emphasis added). And there was nothing unreasonable about its conclusion that costs should not be considered in determining "whether HAP emissions from EGUs pose a hazard to public health or the environment." *Id.* at 24,988; *see id.* at 24,990. That is especially so when "Congress did not authorize the consideration of costs in listing any [other] source categories for regulation under section 112 . . . [and] did not permit the consideration of costs in evaluating whether a source category could be delisted pursuant to the provisions of section 112(c)(9)." *Id.* at 24,989. And while the dissent insists on "the centrality of cost consideration to proper regulatory decisionmaking," Dissent at 6, *Whitman* makes clear the Supreme Court believes that Congress does not necessarily agree. Nor is *Whitman* the only case in which courts have found that Congress legislated in a way the dissent would find irrational.[2]

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[2] *See Am. Textile Mfrs. Inst. v. Donovan*, 452 U.S. 490, 511-12, 101 S. Ct. 2478, 69 L. Ed. 2d 185 (1981) (holding that OSHA is not required to conduct a cost-benefit analysis in promulgating a standard under *section 6(b)(5) of the Occupational Safety and Health Act* because "Congress uses specific language when intending that an agency engage in cost-benefit analysis"); *Tenn. Valley Auth. v. Hill*, 437 U.S. 153, 184, 98 S. Ct. 2279, 57 L. Ed. 2d 117 (1978) ("The plain intent of Congress in enacting [the Endangered Species Act] was to halt and reverse the trend towards species extinction, whatever the cost."); *Union Elec. Co. v. EPA*, 427 U.S. 246, 257-58, 96 S. Ct. 2518, 49 L. Ed. 2d 474 (1976) (holding that EPA may not consider claims of economic infeasibility in evaluating a state requirement that primary ambient air quality standards be met by a certain deadline); *Lead Indus. Ass'n v. EPA*, 647 F.2d 1130, 1150, 208 U.S. App.

Academic generalities, *see* Dissent at 6-8, do not demonstrate that EPA could not reasonably proceed as it did in interpreting congressional intent — especially not generalities by academics who are criticizing the Supreme Court for failing to read congressional statutes as they do.[3] The same is true of utterances by single Justices — especially a separate statement by one Justice concurring in *Whitman* and a question by another during oral argument about a different statutory section. *See* Dissent at 6-7. Nor do the different approaches of the Bush and Obama Administrations on the role of costs in implementing the CAA do more than demonstrate that administrations may differ and can change positions without legal jeopardy, so long as an adequate explanation is provided as was done here. *See Chevron*, 467 U.S. at 865-66. The question before the court is not "Should EPA have considered costs in making its threshold determination under § 112(n)(1)(A)?" but rather "Was EPA required to do so at that point in its regulatory evaluation?" EPA has explained why it concluded costs were not part of the "appropriate and necessary" determination, and

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D.C. 1 (D.C. Cir. 1980) ("We are unable to discern here any congressional intent to require, or even permit, [EPA] to consider economic . . . factors in promulgating air quality standards [under the CAA].").

[3] *See* Cass R. Sunstein, *Interpreting Statutes in the Regulatory State*, 103 HARV. L. REV. *405, 492-93 (1989)* (criticizing *American Textile Manufacturers Institute*, 452 U.S. 490, 101 S. Ct. 2478, 69 L. Ed. 2d 185, for "contributing to the irrationality of the Occupational Safety and Health Act" by "refusing to read the statute" as the author would); Cass R. Sunstein, *Cost-Benefit Default Principles*, 99 MICH. L. REV. 1651, 1671 (2001) (same); Richard J. Pierce, Jr., *The Appropriate Role of Costs in Environmental Regulation*, 54 ADMIN L. REV. 1237, 1253 (2002) (criticizing the *Whitman* Court for relying on an "anti-cost canon").

given Congress's choice to leave the factors entering into that determination to EPA, petitioners, and our dissenting colleague, fail to demonstrate that EPA's considered judgment about the factors to be considered was unlawful as an impermissible and unreasonable interpretation of § 112(n)(1)(A). Congress left to EPA "the accommodation of manifestly competing interests," *id.* at 865, and EPA did all that Congress required of it. Exactly how and when EGU emissions are to be regulated is a different question.

For these reasons, we hold that EPA reasonably concluded it need not consider costs in making its "appropriate and necessary" determination under § 112(n)(1)(A).

3. *Environmental harms.* Petitioners also contend that EPA was constrained to consider only public health hazards, not environmental or other harms, in making its "appropriate and necessary" determination. In their view, § 112(n)(1)(A) unambiguously forecloses the consideration of non-health effects because the statute requires EPA to make its "appropriate and necessary" determination after considering the results of the Utility Study, which is focused exclusively on identifying "hazards to public health" caused by EGU HAP emissions. *See* SIL Br. 44. Petitioners insist that in 2005 EPA followed the health-only approach.

EPA reasoned that "nothing in the statute suggests that the [EPA] should ignore adverse environmental effects in determining whether to regulate EGUs under section 112." NPRM, 76 Fed. Reg. at 24,988; *see* Final Rule, 77 Fed. Reg. at 9325. To the contrary, EPA concluded that the purpose of the CAA and the statute's express instruction to assess environmental effects in the *Mercury Study* suggest "it is reasonable

to consider environmental effects in evaluating the hazards posed by HAP emitted from EGUs." NPRM, 76 Fed. Reg. at 24,988; *see* Final Rule, 77 Fed. Reg. at 9325. EPA explained in response to comments that restricting it from considering environmental harms would "incorrectly conflate[] the requirements for the Utility Study with the requirement to regulate EGUs under CAA section 112 if EPA determines it is appropriate and necessary to do so." Final Rule, 77 Fed. Reg. at 9325.

EPA did not err in considering environmental effects alongside health effects for purposes of the "appropriate and necessary" determination. Although petitioners' interpretation of § 112(n)(1)(A) is plausible, the statute could also be read to treat consideration of the Utility Study as a mere condition precedent to the "appropriate and necessary" determination. EPA has consistently adopted this latter interpretation, including in 2005. *See* 2005 Delisting Decision, 70 Fed. Reg. at 16,002. In the absence of any limiting text, and considering the context (including § 112(n)(1)(B)) and purpose of the CAA, EPA reasonably concluded that it could consider environmental harms in making its "appropriate and necessary" determination. The court need not decide whether environmental effects *alone* would allow EPA to regulate EGUs under § 112, because EPA did not base its determination *solely* on environmental effects. As we explain, *infra* Part II.B.5, EPA's decision to list EGUs can be sustained on the basis of its findings regarding health hazards posed by EGU HAP emissions.

4. *Cumulative impacts of HAP emissions.* On the grounds that § 112(n)(1)(A) directs EPA to study hazards reasonably anticipated to occur "as a result

of" EGU HAP emissions, petitioners contend that EPA was required to base its "appropriate and necessary" determination on public health hazards that occur *exclusively* due to EGU HAPs. Thus, they contend, EPA erred in considering EGU HAP emissions that merely "contribute to" or exacerbate otherwise-occurring health hazards. Petitioners point out that EPA's interpretation conflicts with its approach in 2005, when it read § 112(n)(1)(A) to authorize regulation only upon a showing that EGU emissions *alone* would cause harm.

EPA explained that it could reasonably consider the cumulative impacts of HAP emissions because

> focusing on HAP emissions from EGUs alone when making the appropriate finding ignores the manner in which public health and the environment are affected by air pollution. An individual that suffers adverse health effects as the result of the combined HAP emissions from EGUs and other sources is harmed, irrespective of whether HAP emissions from EGUs alone would cause the harm.

NPRM, 76 Fed. Reg. at 24,988; *see* Final Rule, 77 Fed. Reg. at 9325. EPA acknowledged it was departing from its 2005 approach, *see* NPRM, 76 Fed. Reg. at 24,989, but justified the departure on grounds that the 2005 approach had been "flawed" and "non-scientific" to the extent that "EPA [had] incorrectly determined that U.S. EGU emissions of [mercury] did not constitute a hazard to public health," *id.* at 25,019; *cf.* Final Rule, 77 Fed. Reg. at 9322-23.

EPA's interpretation in the Final Rule is entitled to deference. Section 112(n)(1)(A)'s reference to hazards occurring "as a result of" EGU HAP emissions could

connote hazards *caused solely* by EGU emissions, but it could also connote hazards *exacerbated* by EGU emissions. EPA's commonsense approach to this statutory ambiguity was well within the bounds of its discretion, and it adequately explained its reversal from 2005. Petitioners' contention that EPA erred in considering the effects of HAPs emitted by non-EGU sources is therefore unavailing. In any event, EPA concluded in the Mercury Study that "even if there were no other sources of [mercury] exposure, exposures associated with deposition attributable to U.S. EGUs" would place the most susceptible populations above the methylmercury reference dose. NPRM, 76 Fed. Reg. at 25,010. Thus, EPA *did* find, as petitioners contend it was required to do, that EGU emissions alone would cause health hazards.

5. *Regulation under § 112(d).* Petitioners contend that even if it is "appropriate and necessary" to regulate EGU HAP emissions, such regulation should be effected under § 112(n)(1)(A) to the degree appropriate and necessary — not under § 112(d) through the imposition of MACT standards. They maintain that regulation of EGU HAPs that do not pose health hazards, or regulation at a level higher than needed to eliminate such hazards, is not regulation that is "appropriate and necessary." Petitioners contend that § 112(n)(1)(A)'s instruction to "regulate electric steam generating units *under this section*" (emphasis added) — rather than "*under § 112(d)*" — evinces congressional intent that EGU HAPs should be regulated differently than other sources. SIL Br. 36.

EPA expressly considered and dismissed petitioners' proposed interpretation. EPA concluded that the phrase "under this section" presumptively refers to

regulation under section 112, not to regulation under *subparagraph* 112(n)(1)(A). *See* Final Rule, 77 Fed. Reg. at 9330; NPRM, 76 Fed. Reg. at 24,993. Thus, the plain statutory language suggests "EGUs should be regulated in the same manner as other categories for which the statute requires regulation." Final Rule, 77 Fed. Reg. at 9330. EPA explained:

> CAA section 112 establishes a mechanism to list and regulate stationary sources of HAP emissions. Regulation under CAA section 112 generally requires listing under CAA section 112(c)[] [and] regulation under CAA section 112(d)[.] . . . A determination that EGUs should be listed once the prerequisite appropriate and necessary finding is made is wholly consistent with the language of section 112(n)(1)(A), and listed sources must be regulated under CAA section 112(d).

Id.; *see also id.* at 9326.

EPA acted properly in regulating EGUs under § 112(d). Section 112(n)(1)(A) directs the Administrator to "regulate electric steam generating units under this section, if the Administrator finds such regulation is appropriate and necessary." CAA § 112(n)(1)(A), 42 U.S.C. § 7412(n)(1)(A). EPA reasonably interprets the phrase "under this section" to refer to the entirety of section 112. *See Desert Citizens Against Pollution v. EPA*, 699 F.3d 524, 527, 403 U.S. App. D.C. 55 (D.C. Cir. 2012). Under section 112, the statutory framework for regulating HAP sources appears in § 112(c), which covers listing, and § 112(d), which covers standard-setting. *See* CAA § 112(c), 112(d), 42 U.S.C. § 7412(c), 7412(d). This court has previously noted that "where Congress wished to exempt EGUs from specific requirements of section 112, it said so

explicitly." *New Jersey*, 517 F.3d at 583. EPA reasonably concluded that the framework set forth in § 112(c) and § 112(d) — rather than another, hypothetical framework not elaborated in the statute — provided the appropriate mechanism for regulating EGUs under § 112 after the "appropriate and necessary" determination was made. Therefore, EPA's interpretation is entitled to deference and must be upheld.

6. *Regulation of all HAP emissions*. In the Final Rule, EPA claimed authority to promulgate standards for all listed HAPs emitted by EGUs, not merely for those HAPs it has expressly determined to cause health or environmental hazards. *See, e.g., 77 Fed. Reg. at 9325-26*. Petitioners challenge this approach, maintaining that § 112(n)(1)(A) limits regulation to those individual HAPs that are "appropriate and necessary" to regulate. Petitioners also object that EPA's interpretation contradicts its 2005 rulemaking when it supported a substance-by-substance approach to regulation.

EPA explained its disagreement with petitioners' proposed approach. First, EPA reiterated its view that once an "appropriate and necessary" determination is properly made, "EGUs should be regulated under section 112 in the same manner as other categories for which the statute requires regulation." Final Rule, 77 Fed. Reg. at 9326. EPA then reasoned that this court's decision in *National Lime, 233 F.3d at 633*, "requires [EPA] to regulate *all* HAP from major sources of HAP emissions once a source category is added to the list of categories under CAA section 112(c)." *Id.* (emphasis added). In other words, EPA concluded that if EGUs are to be regulated in the same manner as other source categories, then *all*

HAPs emitted by EGUs should be subject to regulation. *See id.*

EPA did not err by concluding that it may regulate all HAP substances emitted by EGUs. In *National Lime, 233 F.3d at 633*, this court considered whether § 112(d)(1) permitted EPA "to set emission levels only for those listed HAPs" that could be controlled with existing technology. Concluding that EPA had a "clear statutory obligation to set emission standards for each listed HAP," the court held that "the absence of technology-based pollution control devices for HCl, mercury, and total hydrocarbons did not excuse EPA from setting emission standards for those pollutants." *Id.* at 634. Although petitioners attempt to distinguish *National Lime* on grounds that it concerned "major sources" rather than EGUs, they have not provided any compelling reason why EGUs should not be regulated the same way as other sources once EPA has determined that regulation under § 112 is "appropriate and necessary." It also bears emphasis that the plain text of § 112(n)(1)(A) directs the Administrator to "regulate electric utility steam generating units"—not to regulate their *emissions*, as petitioners suggest. This source-based approach to regulating EGU HAPs was affirmed in *New Jersey*, 517 F.3d at 582, which held that EGUs could not be delisted without demonstrating that EGUs, as a category, satisfied the delisting criteria set forth in § 112(c)(9). The notion that EPA must "pick and choose" among HAPs in order to regulate only those substances it deems most harmful is at odds with the court's precedent.

To the extent EPA's interpretation differs from its 2005 approach, it adequately explained its decision. *See* Final Rule, 77 Fed. Reg. at 9325-26. Although

petitioners suggest otherwise, the 2005 Delisting Decision did not address whether EPA could regulate all listed EGU HAPs following an "appropriate and necessary" determination. Here, EPA offered a reasoned explanation for its approach; no more is required. *See Fox Television Stations*, 556 U.S. at 515; *Nat'l Cable & Telecomms. Ass'n*, 545 U.S. at 981.

In view of the above, EPA's conclusion that it may regulate *all* HAP emissions from EGUs must be upheld.

III.

A.

Petitioners assert that even if EPA has correctly interpreted § 112(n)(1)(A), the emission standards that EPA promulgated in the Final Rule are flawed in several respects.

1. *Appropriate and necessary determination.* Petitioners first contend that the agency's determination that it was "appropriate and necessary" to regulate EGUs is arbitrary and capricious. Consistent with their position on the proper interpretation of § 112(n)(1)(A), petitioners take a HAP-by-HAP approach to criticizing EPA's Finding. But, as we explained above, EPA reasonably interprets the CAA as allowing it to regulate *all* EGU HAP emissions pursuant to the usual MACT program once it makes the threshold "appropriate and necessary" determination. The question then is whether EPA reasonably found it appropriate and necessary to regulate EGUs based on all the record evidence before it.

EPA's "appropriate and necessary" determination in 2000, and its reaffirmation of that determination in 2012, are amply supported by EPA's findings

regarding the health effects of mercury exposure. Mercury exposure has adverse effects on human health, primarily through consumption of fish in which mercury has bioaccumulated. *See* Final Rule, 77 Fed. Reg. at 9310. And EGUs are the largest domestic source of mercury emissions. *Id.* Petitioners do not dispute these basic facts, but instead take issue with whether EPA has sufficiently quantified the contribution of EGU mercury emissions to overall mercury exposure. Our case law makes clear, however, that EPA is not obligated to conclusively resolve every scientific uncertainty before it issues regulation. *See Coal. for Responsible Regulation v. EPA*, 684 F.3d 102, 121, 401 U.S. App. D.C. 306 (D.C. Cir. 2012) ("If a statute is precautionary in nature and designed to protect the public health, and the relevant evidence is difficult to come by, uncertain, or conflicting because it is on the frontiers of scientific knowledge, EPA need not provide rigorous step-by-step proof of cause and effect to support an endangerment finding.") (internal quotation marks omitted). Instead, "[w]hen EPA evaluates scientific evidence in its bailiwick, we ask only that it take the scientific record into account in a rational manner." *Id.* at 122 (internal quotation marks omitted).

EPA did so here. As explained in the technical support document (TSD) accompanying the Final Rule, EPA determined that mercury emissions posed a significant threat to public health based on an analysis of women of child-bearing age who consumed large amounts of freshwater fish. *See* Mercury TSD; NPRM, 76 Fed. Reg. at 25,007; Final Rule, 77 Fed. Reg. at 9311-17. The design of EPA's TSD was neither arbitrary nor capricious; the study was reviewed by EPA's independent Science Advisory Board, which stated that it "support[ed] the overall

design of and approach to the risk assessment" and found "that it should provide an objective, reasonable, and credible determination of the potential for a public health hazard from mercury emitted from U.S. EGUs." SAB Letter to EPA Administrator Jackson at 2 (Sept. 29, 2011), EPA-SAB-11-017. In addition, EPA revised the final TSD to address SAB's remaining concerns regarding EPA's data collection practices. *See Final Rule, 77 Fed. Reg. at 9313-16.*[4]

Petitioners' remaining objections center on the change in EPA's position between 2005 and 2012. Although petitioners are correct that EPA weighed certain pieces of evidence differently at different times, the agency reasonably and adequately explained its basis for changing its position on whether mercury emissions posed a sufficient risk to constitute a public health hazard. *See* EPA Br. 40; NPRM, 76 Fed. Reg. at 25,019-20. EPA identified and analyzed what it viewed as technical flaws in the scientific analysis supporting the 2005 Delisting Decision, including a failure to evaluate the cumulative health hazard from EGU emissions when combined with other sources of mercury, NPRM, 76 Fed. Reg.

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[4] For the reasons explained in *UARG v. EPA*, Nos. 12-1166, 12-1366, 12-1420, 744 F.3d 741, 2014 U.S. App. LEXIS 4468, 2014 WL 928230 (D.C. Cir. Mar. 11, 2014), we do not address petitioners' claims that SAB's final report on the Mercury TSD was submitted too late to allow public comment and that EPA unreasonably refused SAB's request to review the final TSD. Petitioners did not raise those issues in comments, and reconsideration is still pending before the agency. Even if these arguments had been properly presented to the agency, petitioners would have forfeited them by raising them only in a cursory footnote in their opening brief before this court. *See Hutchins v. Dist. of Columbia*, 188 F.3d 531, 539 n.3, 338 U.S. App. D.C. 11 (D.C. Cir. 1999) (en banc) ("We need not consider cursory arguments made only in a footnote").

at 25,019, and health hazards from methylmercury exposure above the reference dose, *id.* at 25,020. Those explanations are sufficient to meet the agency's burden. *See Fox Television Stations,* 556 U.S. at 514-16.

2. *Major source classification.* Petitioners contend that in setting emission standards for EGUs, EPA was required to distinguish between "major sources" and "area sources." As relevant here, major sources are automatically subject to MACT controls, while area sources may, in EPA's discretion, be regulated under alternative standards. *See* CAA § 112(a)(1), 112(a)(2), 112(d)(5), 42 U.S.C. § 7412(a)(1), 7412(a)(2), 7412(d)(5). Petitioners assert that EPA's failure to segregate the different types of sources fatally compromises the Final Rule because the EGU emission standards should have been based exclusively on data from major source EGUs. But § 112(d) does not require EPA to regulate EGUs as "major sources" and "area sources"; it merely says that, *if* EPA lists major and area sources, it must then regulate them according to the separate provisions. *See* CAA § 112(d)(1), *42 U.S.C.* § 7412(d)(1).

EPA's decision not to draw such a distinction here is a reasonable one. As EPA emphasizes, distinguishing between major source and area source EGUs runs counter to the separate statutory provisions governing EGUs. While other sources are classified as major or area sources depending on the quantity of emissions they emit, § 112 specifically defines EGUs in terms of their electrical output. *Compare* CAA § 112(a)(8), *with* CAA § 112(a)(1)-(2). Consistent with ordinary rules of statutory construction, EPA reasonably relied on the more specific definition in § 112(a)(8) rather than the general definitions applicable to all

other sources. *See RadLAX Gateway Hotel, LLC v. Amalgamated Bank,* 132 S. Ct. 2065, 2070-72, 182 L. Ed. 2d 967 (2012). Requiring EPA to classify EGUs as major or area sources would also create redundancy in the source-category listing criteria. Section 112(c)(3) of the CAA requires EPA to list area sources for regulation if EPA determines that they "warrant[] regulation." CAA § 112(c)(3), 42 U.S.C. § 7412(c)(3). That finding is arguably unnecessary as applied to EGUs given the requirement in § 112(n)(1)(A) that EPA make a finding that regulation of all EGUs is "appropriate and necessary."

EPA also did not err in declining to exercise its discretionary authority to require less stringent "generally available control technology," or GACT, standards, rather than MACT standards. *Id.* § 112(d)(5), *42 U.S.C.* § 7412(d)(5). In the Final Rule, EPA expressly and reasonably determined that setting separate GACT standards for area source EGUs was unnecessary. *See* Final Rule, 77 Fed. Reg. at 9404, 9438 ("[S]imilar HAP emissions and control technologies are found on both major and area sources" such that "there is no essential difference between area source and major source EGUs with respect to emissions of HAP.").

For these reasons, EPA reasonably declined to interpret § 112 as mandating classification of EGUs as major sources and area sources.

3. *Mercury MACT floor*. Petitioners next challenge EPA's standards for mercury emissions from existing coal-fired EGUs. Petitioners maintain that in calculating the MACT floor for those units, EPA collected emissions data from only those EGUs that were best-performing for mercury emissions. Consequently, petitioners insist, the mercury MACT standard

reflects the results achieved by the "best of the best" EGUs, and not the results of the best 12% of all EGUs, as required by statute.

Petitioners' assertions of a biased or irrational data collection process are not supported by a review of the record. "EPA typically has wide latitude in determining the extent of data-gathering necessary to solve a problem." *Sierra Club v. EPA*, 167 F.3d 658, 662, 334 U.S. App. D.C. 421 (D.C. Cir. 1999). Here, EPA determined that a three-pronged approach was appropriate for developing the mercury MACT standard. First, EPA asked all EGUs for all of their data from 2005-10; it received data from 168 units. Information Collection Request ("ICR") Supporting Statement Part A at 9; *see generally* MACT Floor Analysis Spreadsheets. Second, EPA requested and received data from 50 randomly selected EGUs. ICR Supporting Statement Part B at 2, 7-8. Finally, EPA requested and received data from 170 of the best-performing units for non-mercury emissions. *Id.* EPA initially thought that third group would also be the best-performing for mercury emissions, but it discovered that was not the case after examining the data. *See* Responses to Comments, Dec. 2011, v.1, at 573-76 ("RTC").

Based on the results of its ICR, covering a total of 388 EGUs, EPA chose "the average emission limitation achieved by the best performing 12 percent" of all existing sources "for which [it] ha[d] emissions information," as authorized by CAA § 112(d)(3)(A). *See* NPRM, 76 Fed. Reg. at 25,022-23. Although, as EPA acknowledges, it would be arbitrary and capricious for EPA to set a MACT floor based on intentionally skewed data, the facts indicate that EPA did not do so here. Nor does the record suggest

that EPA's data collection efforts resulted in unintentional bias. As previously noted, EPA collected data from a wide range of EGUs because the agency concluded that it could not identify units representing the best-performing 12 percent of mercury emitters. That conclusion is borne out by the data in the record, which showed that some of the best-performing units for particulate matter control were among the worst performing units for mercury control. *See generally* MACT Floor Analysis Spreadsheets. Similarly, many of the mercury best performers (32 of the best performing 126 units) were not drawn from the pool of units that EPA targeted as best performers for particulate matter. *See* RTC v. 1 at 575. In short, EPA's data-collection process was reasonable, even if it may not have resulted in a perfect dataset.

4. *Acid gas HAP*. EPA did not conclusively determine that emissions of acid gases such as hydrogen chloride from EGUs pose a health hazard. *See* NPRM, 76 Fed. Reg. at 25,016 ("our case studies did not identify significant chronic non-cancer risks from acid gas emissions"). Petitioners say that given that conclusion, EPA should have established a less stringent, health-based emission standard for acid gases under § 112(d)(4). That provision states: "With respect to pollutants for which a health threshold has been established, the Administrator may consider such threshold level, with an ample margin of safety, when establishing emission standards under this subsection." CAA § 112(d)(4), 42 U.S.C. § 7412(d)(4). Section 112(d)(4) makes clear, however, that EPA's authority to set alternate standards is discretionary. *See id.* ("the Administrator *may* consider such threshold level") (emphasis added). Here, EPA concluded that it lacked enough evidence to determine whether

an alternative standard would protect health "with an ample margin of safety." *See* Final Rule, 77 Fed. Reg. at 9405-06. Petitioners dispute EPA's weighing of the evidence, but petitioners offer no compelling basis for second-guessing EPA's analysis.

Petitioners also suggest that regulation of EGU acid gas emissions to address ecosystem acidification conflicts with Congress's decision in the 1990 CAA amendments to address such acidification in Title IV of the CAA. *See* SIL Reply Br. 5. But petitioners failed to raise that argument before the agency, and did not raise it in this court until their reply brief. We therefore deem the argument forfeited. *See Bd. of Regents of Univ. of Washington v. EPA*, 86 F.3d 1214, 1221, 318 U.S. App. D.C. 220 (D.C. Cir. 1996).

5. *UARG delisting petition*. The Utility Air Regulatory Group (UARG) filed a petition with EPA seeking to remove coal-fired EGUs from the list of sources regulated under § 112. EPA denied the petition. Petitioners now argue that that denial was arbitrary and capricious for the same reasons they assert that the agency's determination that it is "appropriate and necessary" to regulate EGUs was incorrect. Assuming, without deciding, that EPA can delist only a subset of the EGU source category, we reject petitioners' argument on this point. As EPA explained in the Final Rule, UARG's delisting petition did not demonstrate that EPA could make either of the two predicate findings required for delisting under § 112(c)(9)(B): (1) that no source in the category emits HAP "in quantities which may cause a lifetime risk of cancer greater than one in one million to the individual in the population who is most exposed" and (2) that emissions from no source in the category "exceed a level which is adequate to protect public

health with an ample margin of safety." CAA § 112(c)(9)(B), 42 U.S.C. § 7412(c)(9)(B); *see also* Final Rule, 77 Fed. Reg. at 9364-65 (discussing technical flaws in UARG's risk analysis).

6. *Chromium emissions data.* Finally, petitioners question the validity of EPA's case study regarding risks from non-mercury EGU emissions. As relevant here, that study found that at 6 of 16 tested facilities, emissions of HAP posed a lifetime cancer risk of more than one in a million to the most exposed individuals. *See* Final Rule, 77 Fed. Reg. at 9319. Petitioners contend that EPA's cancer-risk finding was the product of contaminated emissions samples, and that EPA has refused to correct the emissions data it used. In making this argument, they rely on their own independent "subsequent resampling" of the facilities that EPA examined in conducting its inhalation risk assessment. SIL Br. 52 n.58; UARG, Petition for Reconsideration of MATS Rule at 6-7 (Apr. 16, 2012), EPA-HQ-OAR-2009-0234-20179 (J.A. 2493-94).

EPA did not act arbitrarily or capriciously in relying on the chromium emissions data to which petitioners object. As EPA explained in its responses to comments, the data came from source representatives themselves. RTC v.1 at 187. EPA reasonably believed that these representatives — given their "concern[] about data accuracy" — would review "all data before certifying their accuracy and submitting them to the EPA." *Id.* EPA did not err in relying on this certified data. We cannot consider the data from petitioners' independent resampling, which was conducted after the Final Rule issued and was not part of the administrative record. *See* CAA § 307(d)(7)(A), *42 U.S.C. § 7607(d)(7)(A).*

B.

A group of electric utilities and industry groups have filed a separate petition raising issues specific to industry. Many of industry petitioners' arguments concern circulating fluidized bed EGUs, or CFBs. As relevant here, CFBs differ from conventional pulverized coal units in that CFBs inject air and additional materials, such as limestone, into the combustion zone in order to achieve lower-temperature combustion. At that lower temperature, fuel breaks down to a lesser degree, thus enabling CFBs to control emissions without using add-on controls.

Industry petitioners argue that these design differences required EPA to create a separately regulated subcategory for CFBs. They emphasize that EPA recognized the need for a CFB subcategory in a different rulemaking proceeding, the "Boiler MACT" Rule.

Industry petitioners' CFB-related arguments are unavailing. Contrary to industry petitioners' assertions, nothing in the Clean Air Act "requires" EPA to create a CFB subcategory. Rather, the statute gives EPA substantial discretion in determining whether subcategorization is appropriate. *See* CAA § 112(d)(1), 42 U.S.C. § 7412(d)(1) (EPA "*may* distinguish among classes, types, and sizes of sources") (emphasis added); *see also Nat'l Ass'n of Clean Water Agencies v. EPA*, 734 F.3d 1115, 1159 (D.C. Cir. 2013) ("EPA's subcategorization authority under § 112 involves an expert determination, placing a heavy burden on a challenger to overcome deference to EPA's articulated rational connection between the facts found and the choice made.") (internal quotation marks omitted). EPA's decision not to create a CFB subcategory in the Final Rule is reasonable and well-supported by the

record. Among other things, EPA noted that CFBs were among the best and worst performers for various pollutants, indicating that CFBs have emissions profiles similar to other coal-fired units despite their operational differences. *See* Final Rule, 77 Fed. Reg. at 9397.

The record similarly supports EPA's determination that the 0.002 lb/MMBtu hydrogen chloride limit for CFBs is achievable. As noted above, some CFB units were among the top performers for each of the regulated pollutants, including hydrogen chloride. *See id.* The record thus demonstrates that at least some CFB units are in fact able to achieve the hydrogen chloride limit. In any event, the fact that the Final Rule may not be cost effective for all CFBs does not necessarily mean EPA erred in declining to create a CFB subcategory or in setting emission standards applicable to those units.

EPA's decision to subcategorize CFBs in the Boiler MACT Rule is not to the contrary. There, EPA concluded that CFBs presented relevant differences with respect to carbon monoxide — not mercury, acid gases, or particulates (the pollutants at issue in this rulemaking). *See National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters*, 76 Fed. Reg. 15,608, 15,617-18 (Mar. 21, 2011).

Industry petitioners further argue that at a minimum, EPA should have set separate acid gas standards for coal-refuse-fired CFBs. Those units burn waste coal from other coal-mining operations and use the resulting ashes in mine reclamation projects. Industry petitioners maintain that these fuel-ash reuse efforts would be imperiled by the

stringency of the acid gas standards in the Final Rule.

We conclude that EPA reasonably decided that separate standards for coal-refuse-fired CFBs were not warranted. Industry petitioners' assertion that the hydrogen chloride standards are unattainable for coal-refuse-fired CFBs is undermined by the fact that some of those units were among the best performers for hydrogen chloride. *See* RTC v.1 at 587. EPA also suggested alternative compliance methods that it says would permit coal-refuse-fired CFBs to continue participating in reclamation efforts. *See* Final Rule, 77 Fed. Reg. at 9412. Regardless, nothing in the CAA obligates EPA to set standards in a way that always allows the re-use of fuel ash, even if doing so might be a more desirable outcome for some EGU operators.

C.

In contrast to its decision on CFBs, EPA did create a subcategory for lignite-fired EGUs. (Lignite coal is also referred to as "low rank" coal due to its low heat content.) Industry petitioners argue that the emission standard for the lignite subcategory is based on an improperly calculated minimum stringency level, or MACT floor. Industry petitioners also contend that the emission standard set by EPA is not achievable. We consider these arguments in turn.

1. *MACT floor*. Industry petitioners insist that EPA incorrectly calculated the MACT floor for lignite units, rendering that standard arbitrary and capricious. They assert that EPA used "cherry picked" data from the top 6% of units, instead of the top 12% as required by § 112(d)(3)(A). Finally, industry petitioners argue that EPA did not properly account for variability in lignite coal.

Industry petitioners' data-bias argument is similar to the argument made by the State, Industry & Labor petitioners regarding the mercury MACT floor, *supra* Part III.A.3. And, as with that argument, petitioners' assertions regarding the lignite MACT floor find no support in the record. EPA has offered a reasonable, non-biased explanation of its data-collection and analysis process. *See* MACT Floor Memo at 10; RTC v.1 at 559-60.

Industry petitioners' objections regarding the variability of lignite coal likewise fail. EPA accounted for variability due to differing chemical compositions of coal by applying its Upper Prediction Limit analysis. *See* NPRM, 76 Fed. Reg. at 25,041. Industry petitioners do not challenge that analysis itself. They do suggest in passing that EPA's results are flawed, *see* Industry Pet'rs' Br. 10, but offer no explanation as to why that is so. Such cursory treatment is inadequate to place their challenge to EPA's variability analysis before the court, because "it is not enough merely to mention a possible argument in the most skeletal way, leaving the court to do counsel's work, create the ossature for the argument, and put flesh on its bones." *Davis v. Pension Benefit Guar. Corp.*, 734 F.3d 1161, 1166-67 (D.C. Cir. 2013) (internal quotation marks and alterations omitted). While EPA acknowledged that it could not account for all operational variability, it concluded that its variability analysis "is an appropriate method of addressing the concern that these standards must be met at all times." RTC v.1 at 458. EPA's explanation is sufficient to withstand our "extremely deferential" review of this kind of technical judgment. *New York v. Reilly*, 969 F.2d 1147, 1152, 297 U.S. App. D.C. 147 (D.C. Cir. 1992).

2. *Beyond-the-floor limit.* EPA is permitted to set a more restrictive, "beyond-the-floor" emission standard if the agency determines that such a standard is "achievable" considering costs, energy requirements, and applicable control technologies. CAA § 112(d)(2), 42 U.S.C. § 7412(d)(2). To be "achievable," a standard "must be capable of being met under most adverse conditions which can reasonably be expected to recur." *Nat'l Lime Ass'n v. EPA*, 627 F.2d 416, 431 n.46, 200 U.S. App. D.C. 363 (D.C. Cir. 1980). In this case, industry petitioners argue that EPA failed to consider the limitations of applicable control technologies. As a result, petitioners contend, EPA's beyond-the-floor standard for lignite-fired EGUs is not achievable because the standard mandates unrealistically high levels of mercury reduction.

We reject petitioners' challenge to the beyond-the-floor standard. EPA concluded during the rulemaking process that the standard for lignite units is achievable if sources increase their use of a particular control technology, activated carbon injection. *See* Beyond-the-Floor Memo at 1-4. According to EPA, increased carbon injection can reduce emissions by up to 90%, well in excess of the reductions necessary to reach beyond-the-floor levels. *Id.* at 1-2. Ultimately, the dispute on this issue amounts to a factual disagreement between EPA and petitioners over the effectiveness of activated carbon injection. Because the record contains no data inconsistent with EPA's position on the efficacy of activated carbon injection, we defer to the agency's determination that the beyond-the-floor emission standard for lignite-fired EGUs is achievable.

D.

Public utility companies are subject to certain state-law contracting requirements that may lengthen the process of installing upgraded controls. That added time, industry petitioners argue, requires EPA to grant a blanket, one-year extension of the compliance deadline to public power companies. We disagree. Once again, petitioners' argument amounts to a claim that a decision the Clean Air Act leaves to EPA's discretion should instead be mandatory. *See* CAA § 112(i)(3)(B), 42 U.S.C. § 7412(i)(3)(B) (EPA "may issue" an extension under certain circumstances). EPA explained at length why such a blanket extension was inappropriate. *See* Final Rule, 77 Fed. Reg. at 9407, 9409-11. Most importantly, industry petitioners did not show — and likely could not show — that an extension is necessary for the installation of controls at *every* public power company. On the contrary, EPA's data indicated that "most units will be able to fully comply" within the three-year period established by EPA. Final Rule, 77 Fed. Reg. at 9410. EPA's decision not to issue a blanket extension therefore was not arbitrary or capricious.[5]

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[5] To the extent that petitioners object to EPA's alleged failure to respond to comments on this issue made by public power companies on the ground that this failure violates CAA § 307(d)(6)(B), 42 U.S.C. § 7607(d)(6)(B), we do not address that objection because it was first raised in a pending petition for reconsideration. *See UARG*, 2014 U.S. App. LEXIS 4468, 2014 WL 928230, at *4. We also do not address industry petitioners' arguments concerning the standards for petroleum-coke-fired EGUs and liquid oil-fired non-continental EGUs because those arguments were likewise first raised in a pending petition for reconsideration.

IV.

We turn to the challenges by Environmental petitioners and Julander Energy Company.

A.

Environmental petitioners challenge the provisions of the Final Rule that allow compliance with emission standards to be demonstrated through (1) emissions averaging and (2) options for non-mercury metal HAP emissions monitoring. Chesapeake Climate Action Network, Conservation Law Foundation, Environmental Integrity Project, and Sierra Club object to averaging as unlawful; Chesapeake Climate Action Network and Environmental Integrity Project object to the monitoring options as failing to provide reasonable assurance of compliance. They presented their objections (save one) during the comment period and EPA has responded to them. Although the challenges to emissions averaging are also pending before EPA in a petition for reconsideration, and usually would be incurably premature, *see, e.g.*, *Clifton Power Corp. v. FERC*, 294 F.3d 108, 112, 352 U.S. App. D.C. 310 (D.C. Cir. 2002), the text and legislative history of the Clean Air Act make clear this usual approach is inapplicable, *see UARG v. EPA*, Nos. 12-1166, 12-1366, 12-1420, 744 F.3d 741, 2014 U.S. App. LEXIS 4468, 2014 WL 928230, at *3 (D.C. Cir. Mar. 11, 2014); CAA § 307(b)(1), 42 U.S.C. § 7607(b)(1); S. REP. NO. 101-228, at 3755 (1989).

1. *Averaging*. Under the Final Rule, existing contiguous, commonly-controlled EGUs in the same subcategory can demonstrate compliance by averaging their emissions as an alternative to meeting certain requirements on an individual basis. Final Rule, 77 Fed. Reg. at 9384, 9473-76 (codified at 40 C.F.R.

§ 63.10009). Averaging is permissible only between the same types of pollutants, individual EGUs that are part of the same affected source, EGUs subject to the same emission standard, and existing (not new) EGUs. *Id.* at 9385. Each facility intending to use emissions averaging must develop an emissions averaging plan identifying "(1) [a]ll units in the averaging group; (2) the control technology installed; (3) the process parameter that will be monitored; (4) the specific control technology or pollution prevention measure to be used; (5) the test plan for the measurement of the HAP being averaged; and (6) the operating parameters to be monitored." *Id.* at 9385-86.

Environmental petitioners contend the averaging alternative is unlawful because it relaxes the stringency of the MACT floor standards. With one exception, EPA set the MACT floor standards based on a thirty-boiler operating day averaging period. *Id.* at 9385, 9479-80. Allowing multiple EGUs to average their emissions data effectively extends, petitioners maintain, the standards' averaging period to sixty days (for two units), ninety days (for three units), or more. In their view, a longer averaging period permits longer and larger pollution spikes because high measurements can be averaged over more hours of normal, lower-pollution operations.

Section 112(d)(3), 42 U.S.C. § 7412(d)(3), provides that emission standards for existing sources "shall not be less stringent" than "the average emission limitation achieved by the best performing 12 percent" of such sources. The subsection (d)(2) "beyond-the-floor" requirement provides that emission standards for new or existing sources "shall require the maximum degree of reduction in emissions of the hazardous

air pollutants subject to this section . . . that the Administrator . . determines is achievable." CAA § 112(d)(2), 42 U.S.C. § 7412(d)(2).

EPA permissibly interpreted § 112(d) to allow emissions averaging as provided for in the Final Rule. *See Chevron*, 467 U.S. at 843. That section neither expressly allows nor disallows emissions averaging among multiple units. In the Final Rule, EPA stated:

> Averaging across affected units is permitted only if it can be demonstrated that the total quantity of any particular HAP that may be emitted by that portion of a contiguous major source that is subject to the same standards in the [Final Rule] will not be greater under the averaging mechanism than it could be if each individual affected EGU in the subcategory complied separately with the applicable standard. Under this test, the practical outcome of averaging is equivalent to compliance with the MACT floor limits by each discrete EGU, and the statutory requirement that the MACT standard reflect the maximum achievable emissions reductions is, therefore, fully effectuated.

77 Fed. Reg. at 9385. Viewing averaging as "an equivalent, more flexible, and less costly alternative" to requiring units to demonstrate compliance individually, EPA explained that permitting averaging is part of its "general policy of encouraging the use of flexible compliance approaches where they can be properly monitored and enforced." *Id.*

Environmental petitioners concede the averaging alternative will not result in an increase in a source's total emissions beyond the level permitted under the

applicable standard, *see* Envtl. Pet'rs' Br. 18, and while theoretically averaging could allow an individual unit's emissions to exceed the standard, under the Final Rule that exceedance must be offset by other, better-performing units to demonstrate compliance. They have not challenged EPA's interpretation of the ambiguous term "source," which EPA defined as referring to "the collection of coal- or oil-fired EGUs . . . within a single contiguous area and under common control," Final Rule, 77 Fed. Reg. at 9366, rather than a single EGU. Because § 112(d)(3), 42 U.S.C. § 7412(d)(3), requires EPA to prescribe emissions limitations for "sources," not units, EPA could permissibly establish a standard that allows averaging within a single source. *Cf. Chevron*, 467 U.S. at 866. Although this may allow individual units to exceed the emissions limitation, the statute does not require EPA to regulate emissions on a unit level.

As EPA has observed, Environmental petitioners' main objection appears to be that the Final Rule does not include a "discount factor" whereby emission rates are reduced for sources using an averaging alternative. Petitioners point, for example, to the discount factor included in the Hazardous Organic NESHAP rule, Envtl. Pet'rs' Br. 9-10, in which EPA determined that "to carry out the mandate of section 112(d)(2), some portion of these cost savings [from averaging] should be shared with the environment by requiring sources using averaging to achieve more emission reductions than they would otherwise."[6]

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[6] *National Emission Standards for Hazardous Air Pollutants for Source Categories; Organic Hazardous Air Pollutants from the Synthetic Organic Chemical Manufacturing Industry and Other Processes Subject to the Negotiated Regulation for Equipment Leaks*, 59 Fed. Reg. 19,402, 19,430 (Apr. 22, 1994).

To the extent petitioners' objection is that EPA failed to explain why it did not include a discount factor, EPA, in fact, offered a reasonable and adequate explanation. In the Final Rule, EPA explained that "[g]iven the homogeneity of fuels within the rules subcategories, along with other emissions averaging criteria, the Agency believes use of a discount factor to be unwarranted for this rule." Final Rule, 77 Fed. Reg. at 9386. Further, in responding to comments, EPA explained that unlike the Hazardous Organic rule, "which covers a broad number of unit types, products, and processes," EGUs subject to the Final Rule "differ generally only in the fuel used to produce electricity," a difference, EPA concluded, "accounted for . . . by prohibiting units from differing subcategories — which are fuel based — from participating in emissions averaging." RTC v.2 at 361-62. EPA noted as well its agreement that "other safety factors in the rule obviate the need for a discount factor," *id.* at 363, including the requirement averaging start within three years of promulgation of the Final Rule.

The suggestion by Environmental petitioners that EPA improperly relied on its Upper Prediction Limit ("UPL") analysis to mitigate the effect of averaging on the stringency of emission standards fares no better. The UPL analysis in the MACT floor calculation is designed to "assess variability of the best performers." NPRM, 76 Fed. Reg. at 25,041. To the extent petitioners point to EPA's statement in responding to comments, they ignore its context. EPA stated that it "disagrees with the suggestion that another variability component need be considered for those EGU owners or operators who choose to engage in emissions averaging; the current UPL analyses was [sic] developed to take factors such as those mentioned by the commenter into account." RTC v.2

at 363. According to Environmental petitioners, "the UPL analyses contain nothing that would eliminate (or even mitigate) the Averaging Alternative's additional relaxation of the standards," and it was therefore inappropriate for EPA to rely on this analysis in support of the Final Rule's emissions averaging provisions. Envtl. Pet'rs' Br. 20. But there is nothing to indicate this is what EPA did. In its statement, EPA was responding to industry comments arguing that because EPA had accounted for individual-unit variability in the UPL analysis in setting MACT floors, it was inappropriate to allow a multi-unit facility to further reduce variability by averaging, without applying a discount factor. It is far too great a stretch to read EPA's response as an admission that EPA relied on its UPL analysis to support emissions averaging.

2. *Monitoring*. The Final Rule provides three alternatives to continuous emissions monitoring to demonstrate compliance with the non-mercury metal HAP standards. They are: (1) use of a continuous parametric monitoring system ("CPMS"), (2) quarterly performance testing, and (3) performance testing once every three years for qualifying low emitting EGUs. *See Final Rule*, 77 Fed. Reg. at 9466 (codified at 40 C.F.R. § 63.10000(c)(1)(iii-iv)). Environmental petitioners first challenged CPMS in a pending petition for reconsideration, and therefore that challenge is not properly before the court for decision now. *See UARG*, 2014 U.S. App. LEXIS 4468, 2014 WL 928230, at *4, *5 n.4.

Any EGU may demonstrate compliance with the non-mercury metal standards through quarterly performance tests. Final Rule, 77 Fed. Reg. at 9372, 9384, 9466. If a unit's emission results for all

required tests are less than 50 percent of the applicable emission limit for a three-year period, the EGU may qualify as a low emitting EGU for non-mercury metal HAPs and is then required to conduct performance testing only once every three years, so long as it maintains compliance. *Id.* at 9371, 9466, 9471.

Environmental petitioners maintain that stack testing conducted quarterly or once every three years cannot provide reasonable assurance of compliance with a standard set as a thirty-day emissions rate, given EPA's determination that stack test results are highly variable, and that EPA has failed to explain how compliance options involving long intervals between performance tests and lacking any control of operating conditions between tests can provide sufficiently timely or reliable information to assure compliance. EPA has provided a reasonable explanation for its determination that each of these monitoring options complies with the statutory requirements of CAA §§ 114 and 504.

Section 504(b), 42 U.S.C. § 7661c(b), provides that "continuous emissions monitoring need not be required if alternative methods are available that provide sufficiently reliable and timely information for determining compliance." Although § 114(a)(3), 42 U.S.C. § 7414(a)(3), "require[s] enhanced monitoring" for major stationary sources, there is "no presumption in favor of any particular type of monitoring." *Sierra Club,* 353 F.3d at 991. EPA has "broad discretion in selecting a monitoring regime that ensures compliance," and as long as it "reasonably articulate[s] the basis for its decision," *id.*, the court will "defer to the informed discretion of the Agency," recognizing that "analysis of this issue requires a

high level of expertise," *id.* (quoting *Nat'l Lime*, 233 F.3d at 635).

EPA explained that, in its judgment, "[t]he quarterly stack testing period, coupled with underlying monitoring of control devices or the additional monitoring for liquid oil-fired units, is expected to be frequent enough to ensure that a unit's emissions control devices and processes continue to operate in the same manner as during the previous stack test." RTC v.2 at 93. "If there are significant changes to the operation of the unit or the fuel, then a retest is required to reconfirm that the source remains in compliance under the new operating circumstances." *Id.* EPA acknowledged, with respect to the low emitting EGU option, that the available data "shows an EGU's potential variability," but reasoned that "well-operated EGUs — such as those qualifying for [low emitting EGU] status — are expected to have much less variable emissions" and that "the requirement to revert to the original monitoring frequency should subsequent emissions testing show the EGUs no longer meet [low emitting EGU] status will keep source owners or operators interested in maintaining [that] status." *Id.* at 244. EPA has provided a reasonable explanation for its determinations that these two monitoring options provide sufficient assurance of compliance with the applicable emission standards.

B.

Julander Energy Company, an oil and natural gas development, exploration, and production company, challenges EPA's decision not to adopt stricter emission standards by requiring "fuel switching" by EGUs from coal to natural gas. It contends that EPA unlawfully relied on a non-statutory factor (prohibition of construction of new coal-fired EGUs), failed to con-

sider a required statutory factor (§ 112's requirement that EPA consider collateral benefits of control options), and reached arbitrary and capricious conclusions about natural gas supply and infrastructure and costs.

As a threshold matter, the court must address Julander's standing. Industry intervenor-respondents contend Julander lacks standing under Article III of the Constitution. In fact, Julander's "injury in fact," causation, and redressability under Article III, *see Lujan v. Defenders of Wildlife*, 504 U.S. 555, 560-61, 112 S. Ct. 2130, 119 L. Ed. 2d 351 (1992), are self-evident, *see Sierra Club v. EPA*, 292 F.3d 895, 899-900, 352 U.S. App. D.C. 191 (D.C. Cir. 2002), insofar as the Final Rule does not require EGUs to switch to natural gas, to the detriment of Julander's stated interests, and on remand EPA could require fuel switching. EPA, however, contends Julander lacks "prudential standing" because its interests do not come within the zone-of-interests test articulated in *Association of Data Processing Service Organizations, Inc. v. Camp*, 397 U.S. 150, 90 S. Ct. 827, 25 L. Ed. 2d 184 (1970). The Supreme Court recently clarified that "'prudential standing is a misnomer' as applied to the zone-of-interests analysis," *Lexmark Int'l, Inc. v. Static Control Components, Inc.*, 134 S. Ct. 1377, 188 L. Ed. 2d 392, 2014 WL 1168967, at *6 (U.S. 2014) (quoting *Ass'n of Battery Recyclers, Inc. v. EPA*, 716 F.3d 667, 675-76, 405 U.S. App. D.C. 100 (D.C. Cir. 2013) (Silberman, J., concurring)). The question remains whether Julander's interest is "arguably within the zone of interests to be protected or regulated by the statute." *Match-E-Be-Nash-She-Wish Band of Pottawatomi Indians v. Patchak*, 132 S. Ct. 2199, 2210, 183 L. Ed. 2d 211 (2012) (quoting *Ass'n of Data Processing, 397 U.S. at 153*).

Although the zone-of-interests test "is not meant to be especially demanding," *Clarke v. Secs. Indus. Ass'n*, 479 U.S. 388, 399, 107 S. Ct. 750, 93 L. Ed. 2d 757 (1987), we conclude that Julander falls outside the zone of interests protected by § 112 of the CAA. Notwithstanding our concurring colleague's suggestion, this conclusion is not the result of a "coin flip" to decide which of our precedents to follow. Concurring Op. at 17, 29. The Supreme Court has instructed that "the breadth of the zone of interests varies according to the provisions of law at issue." *Lexmark*, 134 S. Ct. 1377, 188 L. Ed. 2d 392, 2014 WL 1168967, at *8 (citation omitted). Accordingly, this court must be guided by those of our precedents that have interpreted § 112, and not those applying other statutory provisions, including the APA. Those cases hold in the context of challenges to emission standards that competitors of regulated parties fall outside the zone of interests protected by § 112.

In *Association of Battery Recyclers*, 716 F.3d at 674, the court held that a corporation could not challenge EPA's failure to impose more stringent emission standards on its competitors because that interest fell outside the zone of interests protected by § 112. In *Cement Kiln Recycling Coalition v. EPA*, 255 F.3d 855, 871, 347 U.S. App. D.C. 127 (D.C. Cir. 2001), the court similarly held that the purely commercial interests of manufacturers of pollution control equipment seeking more rigorous regulation of their competitors under § 112 were not witnin the zone of interests that Congress intended to be relied upon to challenge EPA's claimed disregard of the CAA. This was so even though their pecuniary interests in increasing demand for their products were aligned with the goals of the CAA. The court explained that Congress's evident purpose in enacting the CAA was

not to compel those sources with less-than-best pollution control to invest in upgraded equipment, but only to meet the standards, as distinct from adopting the methods of emission control, of the best performing sources. *Id.* This court has not read the Supreme Court's decision in *Match-E-Be-Nash-She-Wish Band of Pottawatomi Indians*, 132 S. Ct. 2199, 183 L. Ed. 2d 211, to change the zone-of-interests standard, and the court is bound to follow its own precedent. *See Grocery Mfrs. Ass'n v. EPA*, 693 F.3d 169, 179, 402 U.S. App. D.C. 307 (D.C. Cir. 2012); *id.* at 180 (Tatel, J., concurring).

Julander disputes that it is seeking a competitive advantage by increasing the regulatory burden on its competitors, pointing out that as an oil and natural gas development company it is not a direct competitor of the regulated coal- and oil-fired EGUs. It maintains that it is properly characterized as a vendor to, and not a competitor of, the regulated entities. Nonetheless, the reasoning of our binding precedent encompasses Julander's situation. As the court observed in *Hazardous Waste Treatment Council v. EPA*, 861 F.2d 277, 282, 274 U.S. App. D.C. 44 (D.C. Cir. 1988), where the Treatment Council, much like Julander, claimed its interests, although pecuniary, were "in sync" with those sought to be served by the Resource Conservation and Recovery Act, the Supreme Court's standard in *Clarke* "leaves the status of this sort of incidental benefit somewhat unclear." In "find[ing] operational meaning for a test that demands less than a showing of congressional intent to benefit but more than a 'marginal[] rela[tionship]' to the statutory purposes," *id.* at 283 (quoting *Clarke*, 479 U.S. at 399), this court acknowledged that even absent an apparent congressional intent to benefit there may still be "some indicator

that the plaintiff is a peculiarly suitable challenger of administrative neglect [to] support[] an inference that Congress would have intended eligibility," *id.* But the court rejected the notion that the petitioner's "in sync" interests were more than "marginally related" to Congress's environmental purposes. *Id.*

> Whenever Congress pursues some goal, it is inevitable that firms capable of advancing that goal may benefit. If Congress authorized bank regulators to mandate physical security measures for banks, for example, a shoal of security services firms might enjoy a profit potential — detective and guard agencies, manufacturers of safes, detection devices and small arms, experts on entrance control, etc. But in the absence of either some explicit evidence of an intent to benefit such firms, or some reason to believe that such firms would be *unusually suitable champions* of Congress's ultimate goals, no one would suppose them to have standing to attack regulatory laxity. And of course a rule that gave any such plaintiff standing merely because it happened to be disadvantaged by a particular agency decision would destroy the requirement of prudential standing; any party with constitutional standing could sue.

Id. (emphasis added). In *Cement Kiln*, 255 F.3d at 871, the court embraced this analysis as no less applicable to the CAA. The court has further observed that "judicial intervention may defeat statutory goals if it proceeds at the behest of interests that coincide only accidentally with those goals," *Hazardous Waste*, 861 F.2d at 283, and that "open-ended emissions standards" are particularly susceptible to such "manipulation," *Honeywell Int'l Inc. v. EPA*, 374

F.3d 1363, 1371, 362 U.S. App. D.C. 538 (D.C. Cir. 2004).

Ethyl Corp. v. EPA, 306 F.3d 1144, 353 U.S. App. D.C. 318 (D.C. Cir. 2002), is of no aid to Julander. In that case, the court held that a manufacturer of fuel additives seeking information (through an open process for testing emissions control systems) in order to comply with its own regulatory obligations fell within the zone of interests protected or regulated by the CAA. *See id.* at 1148. Ethyl had an interest that "appear[ed] congruent with those of the [CAA], i.e., the development of products that will reduce harmful air pollutants," *id.*, without the potential for distortion of the regulatory process of concern to the court in *Hazardous Waste*, 861 F.2d at 285, and *Cement Kiln*, 255 F.3d at 871. Unlike petitioners seeking to increase the regulatory burden on others in order to advance their own commercial interests, Ethyl sought access to information to "improve its products with an eye to conformity to emissions needs" and to "secur[e] EPA approval for its own fuel additive products under the [Clean Air] Act." *Ethyl Corp.*, 306 F.3d at 1147-48. The court emphasized "the interdependence between motor vehicle certification under the Act (the process at stake here) and fuel regulations (under which Ethyl is a direct regulatee)." *Id.* at 1148. Julander, in contrast, seeks stricter regulation of coal- and oil-fired EGUs, not information that would enable it to comply with its own regulatory obligations.

Julander's suggestion that its interests are properly characterized as those of a vendor, not a competitor, is unavailing. It cannot rely on its existing relationship with natural gas-fired EGUs because they are not subject to the Final Rule, 77 Fed. Reg. at

9309. And claiming that it has standing as a potential vendor to coal- and oil-fired EGUs, in the event they were forced to switch to natural gas, is at odds with the reasoning underlying the vendor-vendee line of cases. A vendor has standing "to assert the interest of [regulated] vendees." *Nat'l Cottonseed Products Ass'n v. Brock*, 825 F.2d 482, 490, 263 U.S. App. D.C. 345 (D.C. Cir. 1987) (citing *FAIC Secs., Inc. v. United States*, 768 F.2d 352, 360-61, 247 U.S. App. D.C. 235 (D.C. Cir. 1985)). Julander is not standing in for the interests of its potential vendees, which, in fact, here challenge Julander's petition. Consequently, the interests of Julander and the regulated industry petitioners are not "two sides of the same coin." *FAIC Secs.*, 768 F.2d at 359.

Julander had the opportunity to submit its views on fuel switching to EPA during the rulemaking proceedings. And it did. *See* Julander Comments Aug. 4, 2011. It could also have sought permission to appear as amicus in this court, which it did not. Absent any reason to conclude that it is an "unusually suitable champion[]" of Congress' goals in the CAA, we hold, consistent with this court's precedent, that Julander's interest in increasing the regulatory burden on others falls outside the zone of interests protected by the CAA and therefore Julander may not proceed as a petitioner in this court.

CONCUR BY: KAVANAUGH (In Part)

DISSENT BY: KAVANAUGH (In Part)

DISSENT

KAVANAUGH, *Circuit Judge*, concurring in part and dissenting in part: Suppose you were the EPA Administrator. You have to decide whether to go

forward with a proposed air quality regulation. Your only statutory direction is to decide whether it is "appropriate" to go forward with the regulation. Before making that decision, what information would you want to know? You would certainly want to understand the benefits from the regulations. And you would surely ask how much the regulations would cost. You would no doubt take both of those considerations — benefits and costs — into account in making your decision. That's just common sense and sound government practice.

So it comes as a surprise in this case that EPA excluded any consideration of costs when deciding whether it is "appropriate" — the key statutory term — to impose significant new air quality regulations on the Nation's electric utilities. In my view, it is unreasonable for EPA to exclude consideration of costs in determining whether it is "appropriate" to impose significant new regulations on electric utilities. To be sure, EPA could conclude that the benefits outweigh the costs. But the problem here is that EPA did not even consider the costs. And the costs are huge, about $9.6 billion a year — that's billion with a b — by EPA's own calculation.

In Part I of this opinion, I explain my respectful disagreement with the majority opinion's decision to uphold EPA's exclusion of cost from its decision-making under this statutory provision.

In Part II of this opinion, I write to address this Court's case law applying the "zone of interests" test under the Administrative Procedure Act. I accept the majority opinion's conclusion that petitioner Julander Energy Corporation — a natural gas company challenging EPA's allegedly unlawful under-regulation of Julander's competitor coal and oil companies — does

not fall within the "zone of interests" of the Clean Air Act, at least as the zone of interests test has been applied by some decisions of this Court. But those decisions are inconsistent with other decisions of this Court and, more importantly, are incompatible with a 40-year string of Supreme Court decisions applying the "zone of interests" test. Put simply, our case law applying the zone of interests test is in a state of disorder and needs to be cleaned up in the near future.

I

These consolidated cases concern EPA's Final Rule, "National Emission Standards for Hazardous Air Pollutants From Coal- and Oil-Fired Electric Utility Steam Generating Units," 77 Fed. Reg. 9304 (Feb. 16, 2012). The Rule implements provisions of the Clean Air Act, 42 U.S.C. § 7401 et seq., regarding emissions of hazardous air pollutants.

As the majority opinion recounts, the Clean Air Act originally provided EPA substantial discretion to identify and regulate pollution from sources emitting hazardous air pollutants. That approach proved to be time-consuming and largely unworkable, so in 1990 Congress amended the Act to cabin much of EPA's discretion. The 1990 amendments required EPA to identify stationary sources of 189 enumerated hazardous air pollutants and to adopt standards for limiting emissions of those pollutants from those sources. *See 42 U.S.C. § 7412.*[1] Those technology-

[1] Six other common pollutants emitted by stationary sources are regulated under a different section of the Clean Air Act. The National Ambient Air Quality Standards, or NAAQS, prescribe the maximum permissible levels of those six pollutants in the ambient air. *See* 42 U.S.C. § 7409(a)-(b). Under that NAAQS program, EPA must choose levels for emissions of those pollu-

based standards are commonly referred to as the "maximum achievable control technology," or MACT, standards.

EPA uses a two-step process for setting MACT standards. It begins by setting a minimum stringency level, or "floor," based on the performance of the best-performing units in a particular source category. *See id.* § 7412(d)(3). At that first step, EPA may not consider costs. Once the agency sets the statutory floor, it then determines, considering cost and the other factors listed in Section 112(d)(2), whether an even more restrictive standard is "achievable." *Id.* § 7412(d)(2). EPA refers to these stricter requirements as "beyond-the-floor" standards.

The two-step process outlined in Section 112(d) — what I will call the MACT program — applies automatically to most sources of hazardous air pollutants.

But for one category of sources – electric utilities – Congress devised an alternative system as set forth in Section 112(n)(1)(A) of the Act.[2] That alternative system erects two threshold hurdles *before* EPA may regulate electric utilities under the MACT program. *First*, Congress required EPA to "perform a study of the hazards to public health reasonably anticipated to occur as a result of emissions by" electric utilities and report the results of the study to Congress within three years of the enactment of the amendments. *Id.* § 7412(n)(1)(A). *Second*, Congress provided that after the study was completed, EPA could regulate electric

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tants which, "allowing an adequate margin of safety, are requisite to protect the public health." *Id.* § 7409(b)(1).

[2] The electric utilities included in this alternative system are coal- and oil-fired electric utility steam generating units.

utilities under the MACT program only "if the Administrator finds such regulation is *appropriate* and necessary after considering the results of the study." *Id.* (emphasis added).[3]

The meaning of Section 112(n)(1)(A) — particularly the term "appropriate" — is a critical question in this litigation. Industry petitioners and EPA dispute whether EPA, when determining whether regulation of electric utilities under the MACT program is "appropriate," must consider the cost to industry and the public from regulating electric utilities under that program.[4]

EPA thinks not. EPA acknowledges that, in the past, it has interpreted and applied the word "appropriate" in this statute to provide for the consideration of costs. *See* 70 Fed. Reg. 15,994, 16,001 & n.19 (Mar.

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[3] In full, the relevant section of the statute reads: "The Administrator shall perform a study of the hazards to public health reasonably anticipated to occur as a result of emissions by electric utility steam generating units of pollutants listed under subsection (b) of this section after imposition of the requirements of this chapter. The Administrator shall report the results of this study to the Congress within 3 years after November 15, 1990. The Administrator shall develop and describe in the Administrator's report to Congress alternative control strategies for emissions which may warrant regulation under this section. The Administrator shall regulate electric utility steam generating units under this section, if the Administrator finds such regulation is appropriate and necessary after considering the results of the study required by this subparagraph." 42 U.S.C. § 7412(n)(1)(A).

[4] The other key statutory term in Section 112(n)(1)(A) — "necessary" — is not in dispute. EPA states that regulation of electric utilities is necessary "if the identified or potential hazards to public health or the environment will not be adequately addressed by the imposition of the requirements of" the *Clean* Air Act. 76 Fed. Reg. 24,976, 24,987 (May 3, 2011).

29, 2005). But the agency has changed its interpretation. EPA's position now is that EPA may reasonably exclude consideration of costs in determining whether it is "appropriate" to regulate electric utilities under the MACT program. The majority opinion upholds EPA's interpretation.

I respectfully disagree with the majority opinion. It is certainly true, as the majority opinion states, that the word "appropriate" is ambiguous in isolation, and that an agency's reasonable interpretation of an ambiguous statutory term is permissible. *See Chevron U.S.A. Inc. v. NRDC*, 467 U.S. 837, 104 S. Ct. 2778, 81 L. Ed. 2d 694 (1984). But the agency's answer must be "a permissible construction of the statute" — or put another way, the agency's interpretation of the ambiguity must be reasonable. *Id. at 843*. Moreover, under the APA, an agency must consider the relevant factors when exercising its discretion under the governing statute. *See Motor Vehicle Manufacturers Association of the United States, Inc. v. State Farm Mutual Automobile Insurance Co.*, 463 U.S. 29, 42-43, 103 S. Ct. 2856, 77 L. Ed. 2d 443 (1983).

In this case, whether one calls it an impermissible interpretation of the term "appropriate" at *Chevron* step one, or an unreasonable interpretation or application of the term "appropriate" at *Chevron* step two, or an unreasonable exercise of agency discretion under *State Farm*, the key point is the same: It is entirely unreasonable for EPA to exclude consideration of costs in determining whether it is "appropriate" to regulate electric utilities under the MACT program.

To begin with, consideration of cost is commonly understood to be a central component of ordinary regulatory analysis, particularly in the context of

health, safety, and environmental regulation. And Congress legislated against the backdrop of that common understanding when it enacted this statute in 1990. Put simply, as a matter of common sense, common parlance, and common practice, determining whether it is "appropriate" to regulate requires consideration of costs.

Drawing on his extensive administrative law and regulatory experience, not to mention his experience as a jurist, Justice Breyer has perhaps best explained the centrality of cost consideration to proper regulatory decisionmaking. In order "better to achieve regulatory goals — for example, to allocate resources so that they save more lives or produce a cleaner environment — regulators must often take account of all of a proposed regulation's adverse effects." *Whitman v. American Trucking Associations*, 531 U.S. 457, 490, 121 S. Ct. 903, 149 L. Ed. 2d 1 (2001) (Breyer, J., concurring). That is so because "every real choice requires a decisionmaker to weigh advantages against disadvantages, and disadvantages can be seen in terms of (often quantifiable) costs." *Entergy Corp. v. Riverkeeper, Inc.*, 556 U.S. 208, 232, 129 S. Ct. 1498, 173 L. Ed. 2d 369 (2009) (opinion of Breyer, J.). Cost is a particularly salient consideration for administrative agencies today, "in an age of limited resources available to deal with grave environmental problems, where too much wasteful expenditure devoted to one problem may well mean considerably fewer resources available to deal effectively with other (perhaps more serious) problems." *Id.* at 233. An "absolute prohibition" on considering costs "would bring about irrational results. . . . [I]t would make no sense to require plants to spend billions to save one more fish or plankton. That is so even if the industry might

somehow afford those billions." *Id.* at 232-33 (internal citation and quotation marks omitted).

In addition to Justice Breyer, many other leading jurists and scholars on administrative law have likewise recognized that cost generally has to be a relevant factor in the overall regulatory mix. Consider the following:

- Justice Kagan: "[W]hat does it take in a statute to make us say, look, Congress has demanded that the regulation here occur without any attention to costs? In other words, essentially, Congress has demanded that the regulation has occurred in a fundamentally silly way." Transcript of Oral Argument at 13, *EPA v. EME Homer City Generation, L.P.*, No. 12-1182 (U.S. Dec. 10, 2013).[5]
- Professor Sunstein: "Without some sense of both costs and benefits — both nonmonetized and monetized — regulators will be making a stab in the dark." Cass R. Sunstein, *Cost-Benefit Analysis and the Environment*, ETHICS 351, 354 (2005).
- Professor Sunstein: "A rational system of regulation looks not at the magnitude of the risk alone, but assesses the risk in comparison to the costs." Cass R. Sunstein, *Interpreting Statutes in the Regulatory State*, 103 HARV. L. REV. 405, 493 (1989).

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[5] To be clear, I do not read the statutory text at issue in the *EME Homer* case as encompassing costs, at least not in the way EPA argued there. But regardless of how that particular case turns out, the background principle succinctly articulated by Justice Kagan at oral argument reflects the commonsense and well-settled understanding that cost is an essential factor in determining whether it is "appropriate" to regulate.

- Professor Sunstein: "[A]ny reasonable judgment will ordinarily be based on some kind of weighing of costs and benefits, not on an inquiry into benefits alone. . . . If the costs would be high and the benefits low, on what rationale should . . . the EPA refuse even to consider the former? There appears to be no good answer. If there is not, the agency's interpretations should be declared unreasonable." Cass R. Sunstein, *Cost-Benefit Default Principles*, 99 MICH. L. REV. 1651, 1694 (2001).

- Professors Revesz and Livermore: "For certain kinds of governmental programs, the use of cost-benefit analysis is a requirement of basic rationality." RICHARD L. REVESZ & MICHAEL A. LIVERMORE, RETAKING RATIONALITY 12 (2008).

- Professor Pierce: "All individuals and institutions naturally and instinctively consider costs in making any important decision. . . . [I]t is often impossible for a regulatory agency to make a rational decision without considering costs in some way." Richard J. Pierce, Jr., *The Appropriate Role of Costs in Environmental Regulation*, 54 ADMIN. L. REV. 1237, 1247 (2002).

Every presidential administration for more than three decades has likewise made analysis of costs an integral part of the internal Executive Branch regulatory process. *See generally* Helen G. Boutrous, *Regulatory Review in the Obama Administration: Cost-Benefit Analysis for Everyone*, 62 ADMIN. L. REV. 243, 246-48 (2010). Most recently, in 2011, President Obama issued Executive Order 13,563, which follows an earlier Order issued by President Clinton and followed by President George W. Bush. The Order directs each agency "to use the best available

techniques to quantify anticipated present and future benefits and costs as accurately as possible." 76 Fed. Reg. 3821, 3821 (Jan. 21, 2011). Under President Obama's Executive Order, agencies may proceed with proposed regulations only if the benefits justify the costs. *Id.*

To be clear, Congress may itself weigh the costs of a particular kind of regulation, or otherwise take costs out of the equation, when assigning authority to executive and independent agencies to regulate a particular industry or in a particular area. *See Whitman v. American Trucking Associations*, 531 U.S. 457, 121 S. Ct. 903, 149 L. Ed. 2d 1 (2001) (statutory provision does not include consideration of costs). And even when an agency has to take costs into account, it of course may conclude that the benefits of a proposed regulation outweigh the costs. Moreover, different agency heads, and different Presidents, may assess and weigh certain benefits and costs differently depending on their overarching philosophies.

But when considering just as a general matter whether it is "appropriate" to regulate, it is well-accepted that consideration of costs is a central and well-established part of the regulatory decisionmaking process.

But EPA did not consider costs here. And EPA's failure to do so is no trivial matter. The estimated cost of compliance with EPA's Final Rule is approximately $9.6 billion per year, *by EPA's own calculation*. 77 Fed. Reg. at 9306, Table 2. To put it in perspective, that amount would pay the annual health insurance premiums of about two million Americans. It would pay the annual salaries of about 200,000 members of the U.S. Military. It would cover

the annual budget of the entire National Park Service three times over. Put simply, the Rule is "among the most expensive rules that EPA has ever promulgated." JAMES E. MCCARTHY, CONGRESSIONAL RESEARCH SERVICE, R42144, EPA'S UTILITY MACT: WILL THE LIGHTS GO OUT? 1 (2012).

EPA calculated the $9.6 billion cost figure as part of its Regulatory Impact Analysis accompanying the Rule. That Regulatory Impact Analysis was required by President Obama's Executive Order. Yet EPA's official position in this Court is that the costs identified in the Regulatory Impact Analysis should have "no bearing on" the determination of whether regulation is appropriate. EPA Br. 55.

On the other side of the ledger, the benefits of this Rule are disputed: Industry petitioners focus on the reduction in hazardous air pollutant emissions attributable to the regulations, which amount to only $4 to $6 million dollars each year. *See* 77 Fed. Reg. at 9428; State, Industry & Labor Br. 21. If those figures are right, the Rule costs nearly $1,500 for every $1 of health and environmental benefit produced. For its part, EPA says it would estimate the benefits at $37 to $90 billion dollars based on what it says are the indirect benefits of reducing $PM_{2.5}$, a type of fine particulate matter that is not itself regulated as a hazardous air pollutant. *See* 77 Fed. Reg. at 9428.

To be sure, as I have said, EPA may be able to conclude that the benefits outweigh the costs in determining whether it is "appropriate" to regulate electric utilities under the MACT program. But to reiterate, that's not what EPA has done in this Rule. Rather, according to EPA, *it is irrelevant how large the costs are or whether the benefits outweigh the costs*

in determining whether it is "appropriate" to regulate electric utilities under the MACT program.

In response to petitioners' claim that the legal issue here has huge real-world consequences, the majority opinion suggests that it may not matter all that much that EPA refused to consider costs in deciding whether it is "appropriate" to regulate electric utilities under the MACT program, because EPA does account for costs in the *second* step of the MACT program, when EPA sets "beyond-the-floor" standards. Maj. Op. at 24. I respectfully find that to be a red herring. After all, once EPA determines that it is appropriate to regulate electric utilities under the MACT program, costs are not relevant at the *first*, "setting the floor" stage of the MACT program. And meeting that floor will be prohibitively expensive, particularly for many coal-fired electric utilities, regardless of whether EPA decides to go further and set a "beyond-the-floor" standard. So in the real world in which electric utilities operate, the financial burden of complying with that *first* "setting the floor" step of the MACT program — where costs are not considered — will likely knock a bunch of coal-fired electric utilities out of business and require enormous expenditures by other coal and oil-fired electric utilities. Telling someone that costs will be considered in a regulatory step that occurs *after* they have already had to pay an exorbitant amount and may already have been put out of business is not especially reassuring. The majority opinion's attempt to downplay the effects of its decision thus rings a bit hollow.

In downplaying the issue here, the majority opinion also says that the result of this case is that electric utilities will just be treated like other

sources. In saying that, the majority opinion, in my respectful view, does not sufficiently account for the fact that treating electric utilities differently from standard sources was the intent of Section 112(n)(1)(A), as revealed by the statutory text. If Congress had intended EPA to consider the costs of regulating electric utilities only when deciding whether to adopt beyond-the-floor standards, and not as a threshold decision in deciding whether to regulate electric utilities under the MACT program to begin with, it would have done one of two things: It would have either automatically regulated electric utilities under the MACT program, as it did with other sources, or provided that regulation under the MACT program would be automatic if the three-year study found that these sources indeed emitted hazardous air pollutants. That Congress declined to choose either of those options, and instead directed EPA to regulate electric utilities under the MACT program only if "appropriate," reinforces the conclusion that Congress intended EPA to consider costs in deciding whether to regulate electric utilities at the threshold, and not simply at the second beyond-the-floor stage of the MACT program.

Not only does EPA's approach depart from the clear statutory scheme, standard agency decision-making, and the common understanding of the term "appropriate" in this regulatory context, it also effectively negates the congressional compromise that was ultimately embodied in the statutory text of the 1990 Act. Under the initial Senate proposal, electric utilities would been have listed as sources under Section 112(c) and therefore automatically regulated under Section 112(d), the MACT program. *See* 3 A LEGISLATIVE HISTORY OF THE CLEAN AIR ACT AMENDMENTS OF 1990, at 4119, 4418-28 (1993). But

the House subsequently modified the Senate bill to make regulation of electric utilities under the MACT program dependent on the results of a study and the Administrator's subsequent determination that regulation was "appropriate" and necessary. *See* 2 *id.* at 2148-49. In the words of the House bill's legislative sponsor, Congressman Oxley, the goal of the counterproposal was to provide "protection of the public health *while avoiding the imposition of excessive and unnecessary costs on residential, industrial, and commercial consumers of electricity.*" *See* 1 *id.* at 1417 (emphasis added). The House's proposal ultimately prevailed with the Conference Committee "because of . . . the extremely high costs that electric utilities will face under other provisions of the new Clean Air Act amendments." *Id.* at 1416. That Conference Committee view — that EPA should avoid imposing unwarranted financial burdens when deciding to regulate electric utilities — is encapsulated in the textual directive that EPA regulate electric utilities under the MACT program only if "appropriate."

The majority opinion here says that the term "appropriate" is ambiguous. But the Supreme Court often looks to legislative history to help inform interpretation of otherwise ambiguous statutes, including in *Chevron* cases. *See Chevron* 467 U.S. at 843 n.9. And here, the legislative history should resolve any lingering ambiguity on the key point of what "appropriate" encompasses. It establishes that Congress in 1990 chose to impose these threshold requirements on EPA specifically because it wanted EPA to consider costs *before* regulating electric utilities under the MACT program. EPA's interpretation of Section 112(n)(1)(A) in this case upsets Congress's careful balance and stacks the deck in favor of regulation of electric utilities under the MACT program. In effect,

EPA's reading of the statute replaces its authority to regulate electric utilities if "appropriate" with a command to regulate electric utilities under the MACT program regardless of costs. That is not what Congress intended or permitted and thus is beyond EPA's authority. *See Chevron*, 467 U.S. at 843 n.9.

In upholding EPA's cost-blind approach, the majority opinion points to other statutory provisions that expressly reference cost and invokes the familiar interpretive canon that "[w]here Congress includes particular language in one section of a statute but omits it in another section of the same Act, it is generally presumed that Congress acts intentionally and purposely in the disparate inclusion or exclusion." *Russello v. United States*, 464 U.S. 16, 23, 104 S. Ct. 296, 78 L. Ed. 2d 17 (1983). The majority opinion assigns particular weight to the Supreme Court's decision in *Whitman v. American Trucking Associations*, 531 U.S. 457, 121 S. Ct. 903, 149 L. Ed. 2d 1 (2001), which referenced that canon when construing a different section of the Clean Air Act. *See Whitman*, 531 U.S. at 467 ("We have therefore refused to find implicit in ambiguous sections of the CAA an authorization to consider costs that has elsewhere, and so often, been expressly granted."). As in *Whitman*, according to the majority opinion, Congress's decision not to explicitly mention cost in Section 112(n)(1)(A), despite doing so in other parts of the Act, creates a negative implication that costs are an unnecessary consideration.

But I respectfully believe the majority opinion is misreading — or at least over-reading — *Whitman*. *Whitman* was a textualist decision written for a unanimous Court by Justice Scalia. It stands for the basic proposition that consideration of costs cannot be

jammed into a statutory factor that, by its terms, otherwise would not encompass "costs," particularly when other provisions of the Act expressly reference costs. *See Entergy*, 556 U.S. at 223 (*Whitman* "stands for the rather unremarkable proposition that sometimes statutory silence, when viewed in context, is best interpreted as limiting agency discretion.").

In *Whitman* itself, the statutory factor was a provision of the Clean Air Act, Section 109(b)(1), that directed EPA to set ambient air quality standards at levels "requisite to protect the public health" with "an adequate margin of safety." 42 U.S.C. § 7409(b)(1). The dispute concerned whether those "modest words" granted EPA "the power to determine whether implementation costs should moderate national air quality standards." 531 U.S. at 468. Concluding that EPA had not been granted such power, the Court speaking through Justice Scalia observed that cost "is *both* so indirectly related to public health *and* so full of potential for canceling the conclusions drawn from direct health effects that it would surely have been expressly mentioned in §§ *108* and 109 had Congress meant it to be considered." *Id.* at 469.

The statutory provision at issue in *Whitman* differs significantly from the statute at issue here. The statutory provision in *Whitman* tied regulation solely to "public health," which is typically a critical factor *on the other side of the balance* from costs, not a factor that includes costs. Here, by contrast, the key statutory term is "appropriate" — the classic broad and all-encompassing term that naturally and traditionally includes consideration of all the relevant factors, health and safety benefits on the one hand and costs on the other. To unblinkingly rely on *Whitman* here is to overlook the distinct language of the relevant

statutes. *Cf. Michigan v. EPA*, 213 F.3d 663, 677-79, 341 U.S. App. D.C. 306 (D.C. Cir. 2000) (the term "significant" "does not in itself convey a thought that significance should be measured in only one dimension," and in "some contexts, 'significant' begs a consideration of costs").

To sum up: All significant regulations involve tradeoffs, and I am very mindful that Congress has assigned EPA, not the courts, to make many discretionary calls to protect both our country's environment and its productive capacity. In this case, if EPA had decided, in an exercise of its judgment, that it was "appropriate" to regulate electric utilities under the MACT program because the benefits outweigh the costs, that decision would be reviewed under a deferential arbitrary and capricious standard of review. *See American Radio Relay League, Inc. v. FCC*, 524 F.3d 227, 247-48, 390 U.S. App. D.C. 34 (D.C. Cir. 2008) (separate opinion of Kavanaugh, J.). But before we assess the merits of any cost-benefit balancing, this statutory scheme requires that we first ensure that EPA has actually considered the costs. *See State Farm*, 463 U.S. at 42-43. In my view, whether we call it a *Chevron* problem or a *State Farm* problem, it is unreasonable for EPA to exclude consideration of costs when deciding whether it is "appropriate" to regulate electric utilities under the MACT program. I respectfully dissent from the majority opinion's contrary conclusion.[6]

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[6] On the *Chevron* point, I add one further comment. When the Government wins a *Chevron* case, it may prevail at *Chevron* step one (because the agency's interpretation of the statute is mandated by the statutory language) or at *Chevron* step two (because the agency's interpretation of an ambiguous statute is at least reasonable). In those cases, the step one or step two

II

This case implicates another important administrative law issue, the "zone of interests" test under the Administrative Procedure Act.[7] The Court holds that petitioner Julander Energy Company falls outside the "zone of interests" the Clean Air Act is designed to protect and thus cannot challenge the Final Rule. The Court reasons that the concerns raised by Julander, a natural gas production company, are merely to seek more stringent regulation of its coal and oil company competitors. *See* Maj. Op. at 57-58.

I reluctantly join that portion of the Court's opinion because it is consistent with *some* of this Court's previous decisions applying the zone of interests test. I hasten to add that the decisions on which the Court today relies are inconsistent with other of this Court's precedents. Given that our case law makes

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label may have practical significance, as it may determine whether the agency could try to adopt a contrary interpretation in the future. On the other hand, when the agency loses a *Chevron* case because the agency has adopted an interpretation outside the permissible bounds of the statute, even after reading relevant ambiguities in the agency's favor, there is not much if any practical difference for purposes of future agency action whether we label our decision as *Chevron* step one or *Chevron* step two. *See generally City of Arlington v. FCC*, 133 S. Ct. 1863, 1868, 1874, 185 L. Ed. 2d 941 (2013). So it is here, in my view.

[7] This Court has traditionally referred to the zone of interests test as a component of "prudential standing." As the Supreme Court has recently explained, however, the test does not belong under the "prudential" rubric. *Lexmark International, Inc. v. Static Control Components, Inc.*, 134 S. Ct. 1377 188 L. Ed. 2d 392 (U.S. 2014). Instead, whether a plaintiff comes with the "zone of interests" is a statutory question "that requires us to determine, using traditional tools of statutory interpretation, whether a legislatively conferred cause of action encompasses a particular plaintiff's claim." *Id.*, slip op. at 8.

this issue a de facto coin flip, I cannot fault an opinion that lands on heads rather than tails.

I am concerned, however, about the erratic inconsistency in our case law. I am even more concerned that our cases holding that competitors are outside the zone of interests — including today's decision — are inconsistent with the governing Supreme Court precedents. I write separately to explain my concerns.

The Supreme Court first announced the APA "zone of interests" test in *Association of Data Processing Service Organizations, Inc. v. Camp*, 397 U.S. 150, 90 S. Ct. 827, 25 L. Ed. 2d 184 (1970) (*Data Processing*). In that case, vendors of data processing services challenged the Comptroller of the Currency's decision to allow competitor national banks to sell the same services. The data processing vendors alleged that the agency decision violated a provision of the National Bank Act. The district court dismissed the case for lack of standing, and the court of appeals affirmed the dismissal. The Supreme Court reversed. For purposes of Article III standing, the Court first said that there was "no doubt" that the petitioners had alleged a sufficient "injury in fact." *Id. at 152*. In reaching that conclusion, the Court rejected the then-prevailing requirement that plaintiffs show that a defendant's actions invaded a "legal interest" belonging to the plaintiff. *Id. at 153*. The Court instead adopted the now-familiar "injury in fact" test.

For purposes of the APA, the Court added that the separate question of being able to sue under the APA "concerns, apart from the 'case' or 'controversy' test, the question whether the interest sought to be protected by the complainant is arguably within the zone of interests to be protected or regulated by the statute or constitutional guarantee in question." *Id.*

And the Court said that the "zone of interests" requirement was satisfied by the plaintiffs in *Data Processing*, who were competitors of the national banks. The Court noted with approval the "trend . . . toward enlargement of the class of people who may protest administrative action." *Id.* at 154. In keeping with that trend, the Court refused to take an overly restrictive view of "the generous review provisions" of the APA, which the Court noted should be construed "not grudgingly but as serving a broadly remedial purpose." *Id.* at 156.[8]

The Supreme Court reaffirmed its broad understanding of the zone of interests test in *Arnold Tours, Inc. v. Camp*, 400 U.S. 45, 91 S. Ct. 158, 27 L. Ed. 2d 179 (1970) and *Investment Company Institute v. Camp*, 401 U.S. 617, 91 S. Ct. 1091, 28 L. Ed. 2d 367 (1971). The plaintiffs in both cases were competitors of national banks. Both cases concerned decisions by the Comptroller of the Currency to authorize national banks to offer new services to customers: travel services in *Arnold Tours* and investment services in *Investment Company Institute*. And in both cases, the Court held that plaintiffs who would have to compete with the banks under the new regulations satisfied the zone of interests test and could challenge the Comptroller's decision. *See Arnold Tours*, 400 U.S. at 46; *Investment Company Institute*, 401 U.S. at 620-21.

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[8] Although *Data Processing* referenced the Administrative Procedure Act, the opinion did not explicitly tie the zone of interests test to the text of the APA. The Court subsequently clarified that the zone of interests test is a "gloss" on Section 702 of the APA, which grants the right to judicial review of an agency action to any person "adversely affected or aggrieved" by that action. *See Clarke v. Securities Industry Association*, 479 U.S. 388, 395, 400 n.16, 107 S. Ct. 750, 93 L. Ed. 2d 757 (1987).

Notably, Justice Harlan dissented in *Investment Company Institute* because there was no evidence of "any congressional concern for the interests of petitioners and others like them in freedom from competition." *Investment Company Institute*, 401 U.S. at 640 (Harlan, J., dissenting). But that fact, the Court held, was not fatal to the plaintiffs' case; it was enough to satisfy the zone of interests test that Congress, for its own reasons, "did legislate against the competition that the petitioners challenge." *Id.* at 621 (majority opinion).

Thus, at the time of its inception, the zone of interests test was understood to be part of a broader trend toward *expanding* the class of persons able to bring suits under the APA challenging agency actions. *See Copper & Brass Fabricators Council, Inc. v. Department of the Treasury*, 679 F.2d 951, 953 n.2, 220 U.S. App. D.C. 133 (D.C. Cir. 1982) (R.B. Ginsburg, J., concurring) (in each of the Supreme Court's first four zone of interests decisions, the Court "utilized the 'zone' test to reverse lower court decisions which had held that the respective plaintiffs lacked standing"). Although the Supreme Court was cognizant of the dangers of freely permitting judicial review of agency decisions, it nonetheless "struck the balance in a manner favoring review," as the Court later described it, excluding only "those would-be plaintiffs not even arguably within the zone of interests to be protected or regulated by the statute." *Clarke v. Securities Industry Association*, 479 U.S. 388, 397, 107 S. Ct. 750, 93 L. Ed. 2d 757 (1987) (internal quotation marks omitted).

And importantly for present purposes, the Supreme Court in those early zone of interest cases specifically held that the class of persons who could sue

specifically included plaintiffs who were complaining about what they alleged was unlawfully lax agency regulation of the plaintiffs' competitors. The theory was simple: Competitors, almost by definition, are among the class of people "arguably" to be "protected" when Congress limited the activities of other competitors in the relevant industry. So absent a discernible congressional intent *to preclude suit* by the plaintiffs, the suit could proceed.

In the years following *Data Processing*, however, this Court appeared to resist the Supreme Court's direction on competitor suits under the zone of interests test. This Court's cases still said, for example, that the zone of interests test required "some indicia — however slight — that the litigant before the court was intended to be protected" by the statute providing a cause of action. *See, e.g., Copper & Brass Fabricators*, 679 F.2d at 952 (majority opinion).

In *Clarke v. Securities Industry Association*, 479 U.S. 388, 107 S. Ct. 750, 93 L. Ed. 2d 757 (1987), however, the Supreme Court reaffirmed that it meant what it said in *Data Processing*. And the Court in *Clarke explicitly* stated that D.C. Circuit cases had incorrectly departed from *Data Processing*. *See id.* at 400 n.15.

Clarke was another case in which some plaintiffs argued that the Comptroller of the Currency's regulation of the plaintiffs' competitors was unduly lax. Specifically, securities brokers challenged the Comptroller's decision to exempt certain bank offices that offered brokerage services from restrictions on branch banking. The Court began its analysis by clarifying that although the zone of interests test was "basically one of interpreting congressional intent,"

the inquiry did *not* require a congressional intent to benefit the plaintiff class. *Clarke*, 479 U.S. at 394, 399-400. Rather, suits would be allowed unless a "congressional intent to preclude review" in suits by the plaintiffs was "fairly discernible." *Id.* at 403 (citing *Block v. Community Nutrition Institute*, 467 U.S. 340, 351, 104 S. Ct. 2450, 81 L. Ed. 2d 270 (1984)) (internal quotation marks omitted). The zone of interests test "is a guide for deciding whether, in view of Congress' evident intent to make agency action presumptively reviewable, a particular plaintiff should be heard to complain of a particular agency decision. In cases where the plaintiff is not itself the subject of the contested regulatory action, the test denies a right of review if the plaintiff's interests are so marginally related to or inconsistent with the purposes implicit in the statute that it cannot reasonably be assumed that Congress intended to permit the suit. The test is not meant to be especially demanding." *Id.* at 399.

In sum, *Clarke* confirmed the capacious view of the zone of interests requirement announced in *Data Processing* and similar cases. It reaffirmed the presumption in favor of allowing suit and made clear that the suit should be allowed unless the statute evinces discernible congressional intent to preclude review. *See* 3 RICHARD J. PIERCE, JR., ADMINISTRATIVE LAW TREATISE § 16.9, at 1521 (5th ed. 2010) ("An injured plaintiff has standing under the APA unless Congress intended to preclude judicial review at the behest of parties in plaintiff's class.").

And most importantly for our purposes, *Clarke* confirmed that competitors were presumptively within the zone of interests under the APA when challenging allegedly lax regulation of other competitors in

the relevant industry, absent discernible evidence of contrary congressional intent. *See id.* at 403 ("competitors who allege an injury that implicates the policies of the National Bank Act are very reasonable candidates to seek review of the Comptroller's rulings").

As one respected commentator has summarized the Supreme Court's case law: "It is hardly a caricature to say that the current law is this: Businesses desiring to complain that the government is regulating their competitors with insufficient stringency are *invariably and automatically* held to fall within the zone of interests of any allegedly violated statute . . . ." Jonathan R. Siegel, *Zone of Interests*, 92 GEO. L.J. 317, 347 (2004) (emphasis added).

Despite the apparent clarity of *Clarke* — and its explicit disapproval of this Court's zone of interests cases — some of this Court's post-*Clarke* decisions nonetheless still have barred competitors from suing because they are purportedly outside the zone of interests. For example, in *Hazardous Waste Treatment Council v. EPA*, 861 F.2d 277, 274 U.S. App. D.C. 44 (D.C. Cir. 1988) — a case on which the Court today relies — we considered a claim by waste treatment companies that EPA's waste disposal standards were unduly lax toward some competitors of the waste treatment companies. *Id.* at 283. As I read the cases, *Clarke, Data Processing, Investment Company*, and *Arnold Tours* had contemplated that the zone of interests test would be satisfied in such a scenario. Nevertheless, in *Hazardous Waste*, we held that the plaintiffs did not fall within the zone of interests "in the absence of either some explicit evidence of an intent to benefit such firms, or some reason to believe that such firms would be unusually suitable champi-

ons of Congress's ultimate goals." *Hazardous Waste*, 861 F.2d at 283.

In my view, that language in *Hazardous Waste* is difficult to square with what the Supreme Court said in *Clarke* and earlier cases.[9] In those cases, the Supreme Court had specifically said that there does *not* need to be evidence of an intent to benefit the plaintiff class. In fact, the Supreme Court said that suit should be allowed unless there was a discernible congressional intent *to preclude suit* by the plaintiff class. In other words, this Court's cases seemingly flipped the presumption in favor of allowing suit by competitor plaintiffs to a presumption against allowing suit by competitor plaintiffs.

The confusion in our case law has only grown in the years following *Hazardous Waste*. Sometimes we allow competitors to sue, opining, for example, that we "take from" cases like *Clarke* "the principle that a plaintiff who has a competitive interest in confining a regulated industry within certain congressionally imposed limitations may sue to prevent the alleged loosening of those restrictions." *First National Bank & Trust Co. v. National Credit Union Administration*, 988 F.2d 1272, 1277, 300 U.S. App. D.C. 314 (D.C. Cir. 1993); *see, e.g., Sherley v. Sebelius*, 610 F.3d 69, 75, 391 U.S. App. D.C. 258 (D.C. Cir. 2010) (allowing doctors to sue because of allegedly illegal agency under-regulation of other doctors: "Because the Act can plausibly be interpreted to limit research involving" embryonic stem cells, "the Doctors' interest in preventing the NIH from funding such research is not inconsistent with the purposes of the Amend-

[9] Chief Judge Wald stated as much at the time. *See Hazardous Waste Treatment Council v. Thomas*, 885 F.2d 918, 931, 280 U.S. App. D.C. 296 (D.C. Cir. 1989) (Wald, C.J., dissenting).

ment. . . . [T]hat is all that matters."); *Honeywell International Inc. v. EPA*, 374 F.3d 1363, 1370, 362 U.S. App. D.C. 538 (D.C. Cir. 2004) (allowing chemical manufacturer to sue because of allegedly illegal agency under-regulation of competing chemicals: "If there is reason to believe that a party's interest in statutory enforcement will advance, rather than hinder, the operation of a statute, the court can reasonably assume that Congress intended to permit the suit."); *Ethyl Corp. v. EPA*, 306 F.3d 1144, 1148, 353 U.S. App. D.C. 318 (D.C. Cir. 2002) (allowing manufacturer of fuel additives to sue because of allegedly illegal under-regulation of automobile manufacturers: zone of interests "includes not only those challengers expressly mentioned by Congress, but also unmentioned potential challengers that Congress would have thought useful for the statute's purpose"); *Wabash Valley Power Association, Inc. v. FERC*, 268 F.3d 1105, 1112, 348 U.S. App. D.C. 36 (D.C. Cir. 2001) (allowing power association to sue because of allegedly illegal under-regulation of merging utility companies: "In this case, as a competitor crying foul, Wabash satisfies prudential standing requirements."); *Mova Pharmaceutical Corp. v. Shalala*, 140 F.3d 1060, 1076, 329 U.S. App. D.C. 341 (D.C. Cir. 1998) (allowing drug manufacturer to sue because of allegedly illegal agency under-regulation of other drug manufacturer: "Upjohn's interest in limiting competition for its product is, by its very nature, linked with the statute's goal of limiting competition between generic manufacturers.") (internal citation and quotation marks omitted); *see also Amgen, Inc. v. Smith*, 357 F.3d 103, 109, 360 U.S. App. D.C. 88 (D.C. Cir. 2004) ("Parties motivated by purely commercial interests routinely satisfy the zone of interests test under this court's precedents.").

But other times, as in *Hazardous Waste*, we say exactly the opposite, that competitors are not within the zone of interests and are barred from suing. *See, e.g., Association of Battery Recyclers, Inc. v. EPA*, 716 F.3d 667, 674, 405 U.S. App. D.C. 100 (D.C. Cir. 2013) (lead smelter could not object to lax regulation of other lead smelters: plaintiff objected "not to any regulatory burden imposed on it but instead to the absence of regulatory burdens imposed on its competitors"); *Grocery Manufacturers Association v. EPA*, 693 F.3d 169, 179, 402 U.S. App. D.C. 307 (D.C. Cir. 2012) (food producers could not object to lax regulation of ethanol producers who compete with food producers in market to purchase corn);[10] *Cement Kiln Recycling Coalition v. EPA, 255 F.3d 855, 871, 347 U.S. App. D.C. 127 (D.C. Cir. 2001)* (hazardous waste combustors could not object to lax regulation of competing combustors: "the Council's interest lies only in increasing the regulatory burden on others"); *ANR Pipeline Co. v. FERC, 205 F.3d 403, 408, 340 U.S. App. D.C. 295 (D.C. Cir. 2000)* (natural gas pipeline operator could not object to lax regulation of competitor's pipeline: plaintiff's "only concern is with suppressing competition from Nautilus, and that economic interest is not within the zone of interests protected by NEPA"); *Liquid Carbonic Industries Corp. v. FERC, 29 F.3d 697, 705, 308 U.S. App. D.C. 51 (D.C. Cir. 1994)* (industrial gas corporation could not object to lax regulation of competitor's facilities:

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[10] In *Grocery Manufacturers Association v. EPA*, 693 F.3d 169, 402 U.S. App. D.C. 307 (D.C. Cir. 2012), we addressed an additional question of whether the zone of interests test is a jurisdictional requirement. The Supreme Court has since made clear that the zone of interests test is not jurisdictional. *See Lexmark International, Inc. v. Static Control Components, Inc.*, 134 S. Ct. 1377, 188 L. Ed. 2d 392, 404 n.4 (U.S. 2014).

"There being no indication that Congress intended to benefit a second-tier competitor, Liquid Carbonic does not have standing as an intended beneficiary.").

Those competing lines of cases have developed without any apparent distinguishing principle. Having carefully reviewed all of them together in one sitting, I frankly cannot find a clear line to separate the cases where we have found competitors to be within the zone of interests from the cases where we have not.

Moreover, there is nothing in the Clean Air Act that poses a stricter limit on competitor suits than in APA cases involving other statutes. The default rule set forth by the Supreme Court for APA cases is that competitors may sue, unless the substantive statute at issue excludes such suits. Nothing in the Clean Air Act indicates an intent to exclude competitor suits. And it is surely not incongruent with the Clean Air Act to allow competitor suits. By definition, a successful competitor suit would mean that the source would have to comply with stricter Clean Air Act limits. Put simply: Allowing competitor suits in Clean Air Act cases will mean cleaner air. Excluding competitor suits in Clean Air Act cases will mean dirtier air.

Apart from our case law's internal inconsistency, the larger problem, as I see it, is that the line of cases in this Court that have held that competitors are outside the zone of interests is out of step with the Supreme Court's case law from *Data Processing* to *Clarke*. What is more, the Supreme Court's cases since *Clarke* have only reinforced the broad conception set forth in *Data Processing* and *Clarke*. *See, e.g., National Credit Union Administration v. First National Bank & Trust Co.*, 522 U.S. 479, 493-94, 118

S. Ct. 927, 140 L. Ed. 2d 1 (1998) ("As competitors of federal credit unions, respondents certainly have an interest in limiting the markets that federal credit unions can serve, and the NCUA's interpretation has affected that interest by allowing federal credit unions to increase their customer base."); *see also Air Courier Conference of America v. American Postal Workers Union, AFL-CIO*, 498 U.S. 517, 529, 111 S. Ct. 913, 112 L. Ed. 2d 1125 (1991) ("Clarke is the most recent in a series of cases in which we have held that competitors of regulated entities have standing to challenge regulations."); *Lexmark International, Inc. v. Static Control Components, Inc.*, 134 S. Ct. 1377, 188 L. Ed. 2d 392, 405 (U.S. 2014) (a "lenient approach" to the zone of interests test "is an appropriate means of preserving the flexibility of the APA's omnibus judicial-review provision, which permits suit for violations of numerous statutes of varying character that do not themselves include causes of action for judicial review").

Among the Supreme Court's post-*Clarke* decisions is *Match-E-Be-Nash-She-Wish Band of Pottawatomi Indians v. Patchak*, 132 S. Ct. 2199, 183 L. Ed. 2d 211 (2012). Although not a competitor case, the reasoning of *Match-E* reinforces *Data Processing* and *Clarke*, and reaffirms the Supreme Court's broad conception of the zone of interests under the APA.

Writing for the Court in *Match-E*, Justice Kagan reiterated that the zone of interests requirement is a low bar: The test "is not meant to be especially demanding. We apply the test in keeping with Congress's evident intent when enacting the APA to make agency action presumptively reviewable. *We do not require any indication of congressional purpose to benefit the would-be plaintiff.* And we have always

conspicuously included the word 'arguably' in the test to indicate that the benefit of any doubt goes to the plaintiff. The test forecloses suit only when a plaintiff's interests are so marginally related to or inconsistent with the purposes implicit in the statute that it cannot reasonably be assumed that Congress intended to permit the suit." *Id.* at 2210 (emphasis added) (footnote, citation, and some internal quotation marks omitted).

Match-E reaffirmed — in line with *Data Processing* and *Clarke* — that the plaintiff need not be among a class that Congress intended to benefit in the statute at hand. And *Match-E* further reaffirmed that a wide variety of interests, including economic interests related to the agency's allegedly unlawful action with respect to *someone else*, fall within the zone of interests. There, a residential property owner claimed that the Interior Department violated federal law when it acquired a parcel of land for use by a nearby Indian tribe as a casino. *See id.* at 2202-03. All agreed that the federal statute was not designed to benefit a property owner who objects when the Federal Government acquires another property owner's land in order to help Indians. *See id.* at 2210 n.7. The Supreme Court nonetheless concluded that the zone of interests test was satisfied. The Supreme Court said that "neighbors to the use (like Patchak) are reasonable — indeed, predictable — challengers of the Secretary's decisions: Their interests, *whether economic, environmental, or aesthetic*, come within § 465's regulatory ambit." *Id.* at 2212 (emphasis added).

Given its music and its words, *Match-E* should have put a final end to this Court's crabbed approach to the zone of interests test. But our Court has still

continued since *Match-E* to hold — at least in some cases — that the zone of interests test prevents businesses from complaining about allegedly illegal agency under-regulation of their competitor businesses. *See, e.g., Association of Battery Recyclers,* 716 F.3d at 674; *Grocery Manufacturers Association,* 693 F.3d at 179.

Put simply, our current zone of interests case law is inconsistent and unpredictable. Perhaps most troubling, our cases holding that competitors are outside the zone of interests are inconsistent with Supreme Court precedent, as I read it. In my respectful view, too much is at stake in the administrative process, for health, safety, and environmental regulation, and for the economic interests affected by these cases for us to continue muddling along in this way. This state of affairs should receive a careful examination at some point in the near future. Whether a party can sue in court to challenge illegal agency action on such important matters should not come down to the equivalent of a coin flip. We can do better.

* * *

I respectfully dissent from the majority opinion's conclusion that EPA may reasonably exclude consideration of costs when deciding whether it is appropriate to regulate electric utilities under the MACT program. And on the zone of interests test, I accept the majority opinion's conclusion that Julander falls outside the zone of interests, at least under some of our precedents. But in my view, those precedents are not consistent with other decisions of this Court or with the Supreme Court's case law and should be corrected in due course.

APPENDIX B

UNITED STATES COURT OF APPEALS
FOR THE DISTRICT OF COLUMBIA CIRCUIT

[Filed on April 15, 2014]

No. 12-1100
September Term, 2013

WHITE STALLION ENERGY CENTER, LLC,
Petitioner,

v.

ENVIRONMENTAL PROTECTION AGENCY,
Respondent,

AMERICAN ACADEMY OF PEDIATRICS, *et al.*,
Intervenors.

Consolidated with 12-1101, 12-1102, 12-1147, 12-1172, 12-1173, 12-1174, 12-1175, 12-1176, 12-1177, 12-1178, 12-1180, 12-1181, 12-1182, 12-1183, 12-1184, 12-1185, 12-1186, 12-1187, 12-1188, 12-1189, 12-1190, 12-1191, 12-1192, 12-1193, 12-1194, 12-1195, 12-1196

On Petitions for Review of Final Rule of the United States Environmental Protection Agency

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JUDGMENT

Before: GARLAND, *Chief Judge*, and ROGERS and KAVANAUGH, *Circuit Judges*

These causes came on to be heard on the petitions for review of a Final Rule of the United States Environmental Protection Agency and were argued by counsel. On consideration thereof, it is

ORDERED and ADJUDGED that the petitions for review be denied except that the petition for review in No. 12-1174, *Julander Energy Co. v. EPA*, be dismissed for lack of standing, in accordance with the opinion of the court filed herein this date.

Per Curiam

FOR THE COURT:
Mark J. Langer, Clerk

BY:

/s/
Jennifer M. Clark
Deputy Clerk

Date: April 15, 2014

Opinion *Per Curiam*.

Opinion concurring in part and dissenting in part filed by Circuit Judge Kavanaugh.

APPENDIX C

UNITED STATES CODE SERVICE

Current through PL 113-120, approved 6/10/14

TITLE 42. THE PUBLIC HEALTH AND WELFARE
CHAPTER 85. AIR POLLUTION PREVENTION AND CONTROL PROGRAMS AND ACTIVITIES
AIR QUALITY AND EMISSION LIMITATIONS

42 USCS § 7412

42 USCS § 7412. Hazardous air pollutants

(a) Definitions. For purposes of this section, except subsection (r)—

(1) Major source. The term "major source" means any stationary source or group of stationary sources located within a contiguous area and under common control that emits or has the potential to emit considering controls, in the aggregate, 10 tons per year or more of any hazardous air pollutant or 25 tons per year or more of any combination of hazardous air pollutants. The Administrator may establish a lesser quantity, or in the case of radionuclides different criteria, for a major source than that specified in the previous sentence, on the basis of the potency of the air pollutant, persistence, potential for bioaccumulation, other characteristics of the air pollutant, or other relevant factors.

(2) Area source. The term "area source" means any stationary source of hazardous air pollutants that is not a major source. For purposes of this section, the term "area source" shall not include motor vehicles or nonroad vehicles subject to regulation under title II [42 USCS §§ 7521 et seq.].

(3) Stationary source. The term "stationary source" shall have the same meaning as such term has under section 111(a) [42 USCS § 7411(a)].

(4) New source. The term "new source" means a stationary source the construction or reconstruction of which is commenced after the Administrator first proposes regulations under this section establishing an emission standard applicable to such source.

(5) Modification. The term "modification" means any physical change in, or change in the method of operation of, a major source which increases the actual emissions of any hazardous air pollutant emitted by such source by more than a de minimis amount or which results in the emission of any hazardous air pollutant not previously emitted by more than a de minimis amount.

(6) Hazardous air pollutant. The term "hazardous air pollutant" means any air pollutant listed pursuant to subsec-tion (b).

(7) Adverse environmental effect. The term "adverse environmental effect" means any significant and widespread adverse effect, which may reasonably be anticipated, to wildlife, aquatic life, or other natural resources, including ad-verse impacts on populations of endangered or threatened species or significant degradation of environmental quality over broad areas.

(8) Electric utility steam generating unit. The term "electric utility steam generating unit" means any fossil fuel fired combustion unit of more than 25 megawatts that serves a generator that produces electricity for sale. A unit that co-generates steam and electricity and supplies more than one-third of its potential electric output capacity and more than 25

megawatts electrical output to any utility power distribution system for sale shall be considered an electric utility steam generating unit.

(9) Owner or operator. The term "owner or operator" means any person who owns, leases, operates, controls, or supervises a stationary source.

(10) Existing source. The term "existing source" means any stationary source other than a new source.

(11) Carcinogenic effect. Unless revised, the term "carcinogenic effect" shall have the meaning provided by the Administrator under Guidelines for Carcinogenic Risk Assessment as of the date of enactment. Any revisions in the existing Guidelines shall be subject to notice and opportunity for comment.

(b) List of pollutants.

(1) Initial list. The Congress establishes for purposes of this section a list of hazardous air pollutants as follows:

CAS number	Chemical name
75070	Acetaldehyde
60355	Acetamide
75058	Acetonitrile
98862	Acetophenone
53963	2-Acetylaminofluorene
107028	Acrolein
79061	Acrylamide
79107	Acrylic acid
107131	Acrylonitrile

107051	Allyl chloride
92671	4-Aminobiphenyl
62533	Aniline
90040	o-Anisidine
1332214	Asbestos
71432	Benzene (including benzene from gasoline)
92875	Benzidine
98077	Benzotrichloride
100447	Benzyl chloride
92524	Biphenyl
117817	Bis(2-ethylhexyl)phthalate (DEHP)
542881	Bis(chloromethyl)ether
75252	Bromoform
106990	1,3-Butadiene
156627	Calcium cyanamide
105602	Caprolactam
133062	Captan
63252	Carbaryl
75150	Carbon disulfide
56235	Carbon tetrachloride
463581	Carbonyl sulfide
120809	Catechol
133904	Chloramben
57749	Chlordane
7782505	Chlorine

79118	Chloroacetic acid
532274	2-Chloroacetophenone
108907	Chlorobenzene
510156	Chlorobenzilate
67663	Chloroform
107302	Chloromethyl methyl ether
126998	Chloroprene
1319773	Cresols/Cresylic acid (isomers and mixture)
95487	o-Cresol
108394	m-Cresol
106445	p-Cresol
98828	Cumene
94757	2,4-D,salts and esters
3547044	DDE
334883	Diazomethane
132649	Dibenzofurans
96128	1,2-Dibromo-3-chloropropane
84742	Dibutylphthalate
106467	1,4-Dichlorobenzene(p)
91941	3,3-Dichlorobenzidene
111444	Dichloroethyl ether (Bis(2-chloroethyl)ether)
542756	1,3-Dichloropropene
62737	Dichlorvos
111422	Diethanolamine

121697	N,N-Diethylaniline (N,N-Dimethylaniline)
64675	Diethyl sulfate
119904	3,3-Dimethoxybenzidine
60117	Dimethyl aminoazobenzene
119937	3,3'-Dimethyl benzidine
79447	Dimethyl carbamoyl chloride
68122	Dimethyl formamide
57147	1,1-Dimethyl hydrazine
131113	Dimethyl phthalate
77781	Dimethyl sulfate
534521	4,6-Dinitro-o-cresol, and salts
51285	2,4-Dinitrophenol
121142	2,4-Dinitrotoluene
123911	1,4-Dioxane (1,4-Diethyleneoxide)
122667	1,2-Diphenylhydrazine
106898	Epichlorohydrin (1-Chloro-2,3-epoxypropane)
106887	1,2-Epoxybutane
140885	Ethyl acrylate
100414	Ethyl benzene
51796	Ethyl carbamate (Urethane)
75003	Ethyl chloride (Chloroethane)
106934	Ethylene dibromide (Dibromoethane)
107062	Ethylene dichloride (1,2-Dichloroethane)

107211	Ethylene glycol
151564	Ethylene imine (Aziridine)
75218	Ethylene oxide
96457	Ethylene thiourea
75343	Ethylidene dichloride (1,1-Dichloroethane)
50000	Formaldehyde
76448	Heptachlor
118741	Hexachlorobenzene
87683	Hexachlorobutadiene
77474	Hexachlorocyclopentadiene
67721	Hexachloroethane
822060	Hexamethylene-1,6-diisocyanate
680319	Hexamethylphosphoramide
110543	Hexane
302012	Hydrazine
7647010	Hydrochloric acid
7664393	Hydrogen fluoride (Hydrofluoric acid)
123319	Hydroquinone
78591	Isophorone
58899	Lindane (all isomers)
108316	Maleic anhydride
67561	Methanol
72435	Methoxychlor
74839	Methyl bromide (Bromomethane)
74873	Methyl chloride (Chloromethane)

71556	Methyl chloroform (1,1,1-Trichloroethane)
78933	Methyl ethyl ketone (2-Butanone)
60344	Methyl hydrazine
74884	Methyl iodide (Iodomethane)
108101	Methyl isobutyl ketone (Hexone)
624839	Methyl isocyanate
80626	Methyl methacrylate
1634044	Methyl tert butyl ether
101144	4,4-Methylene bis(2-chloroaniline)
75092	Methylene chloride (Dichloromethane)
101688	Methylene diphenyl diisocyanate (MDI)
101779	4,4'-Methylenedianiline
91203	Naphthalene
98953	Nitrobenzene
92933	4-Nitrobiphenyl
100027	4-Nitrophenol
79469	2-Nitropropane
684935	N-Nitroso-N-methylurea
62759	N-Nitrosodimethylamine
59892	N-Nitrosomorpholine
56382	Parathion
82688	Pentachloronitrobenzene (Quintobenzene)
87865	Pentachlorophenol

108952	Phenol
106503	p-Phenylenediamine
75445	Phosgene
7803512	Phosphine
7723140	Phosphorus
85449	Phthalic anhydride
1336363	Polychlorinated biphenyls (Aroclors)
1120714	1,3-Propane sultone
57578	beta-Propiolactone
123386	Propionaldehyde
114261	Propoxur (Baygon)
78875	Propylene dichloride (1,2-Dichloropropane)
75569	Propylene oxide
75558	1,2-Propylenimine (2-Methyl aziridine)
91225	Quinoline
106514	Quinone
100425	Styrene
96093	Styrene oxide
1746016	2,3,7,8-Tetrachlorodibenzo-p-dioxin
79345	1,1,2,2-Tetrachloroethane
127184	Tetrachloroethylene (Perchloroethylene)
7550450	Titanium tetrachloride
108883	Toluene

95807	2,4-Toluene diamine
584849	2,4-Toluene diisocyanate
95534	o-Toluidine
8001352	Toxaphene (chlorinated camphene)
120821	1,2,4-Trichlorobenzene
79005	1,1,2-Trichloroethane
79016	Trichloroethylene
95954	2,4,5-Trichlorophenol
88062	2,4,6-Trichlorophenol
121448	Triethylamine
1582098	Trifluralin
540841	2,2,4-Trimethylpentane
108054	Vinyl acetate
593602	Vinyl bromide
75014	Vinyl chloride
75354	Vinylidene chloride (1,1-Dichloroethylene)
1330207	Xylenes (isomers and mixture)
95476	o-Xylenes
108383	m-Xylenes
106423	p-Xylenes
0	Antimony Compounds
0	Arsenic Compounds (inorganic including arsine)
0	Beryllium Compounds
0	Cadmium Compounds

0	Chromium Compounds
0	Cobalt Compounds
0	Coke Oven Emissions
0	Cyanide Compounds¬1
0	Glycol ethers¬2
0	Lead Compounds
0	Manganese Compounds
0	Mercury Compounds
0	Fine mineral fibers¬3
0	Nickel Compounds
0	Polycylic Organic Matter¬4
0	Radionuclides (including radon)¬5
0	Selenium Compounds

NOTE: For all listings above which contain the word "compounds" and for glycol ethers, the following applies: Unless otherwise specified, these listings are defined as including any unique chemical substance that contains the named chemical (i.e., antimony, arsenic, etc.) as part of that chemical's infrastructure.

<1> X' CN where X = H' or any other group where a formal dissociation may occur. For example KCN or Ca(CN)[2]

<2> Includes mono- and di- ethers of ethylene glycol, diethylene glycol, and triethylene glycol R-(OCH2CH2)[N]-OR' where

n = 1, 2, or 3

R = alkyl or aryl groups

R' = R, H, or groups which, when removed, yield glycol ethers with the structure: R-(OCH2CH)[N]-OH. Polymers are excluded from the glycol category.

<3> Includes mineral fiber emissions from facilities manufacturing or processing glass, rock, or slag fibers (or other mineral derived fibers) of average diameter 1 micrometer or less.

<4> Includes organic compounds with more than one benzene ring, and which have a boiling point greater than or equal to 100 degrees C.

<5> A type of atom which spontaneously undergoes radioactive decay.

(2) Revision of the list. The Administrator shall periodically review the list established by this subsection and publish the results thereof and, where appropriate, revise such list by rule, adding pollutants which present, or may present, through inhalation or other routes of exposure, a threat of adverse human health effects (including, but not limited to, substances which are known to be, or may reasonably be anticipated to be, carcinogenic, mutagenic, teratogenic, neurotoxic, which cause reproductive dysfunction, or which are acutely or chronically toxic) or adverse environmental effects whether through ambient concentrations, bioaccumulation, deposition, or otherwise, but not including releases subject to regulation under subsection (r) as a result of emissions to the air. No air pollutant which is listed under section 108(a) [42 USCS § 7408(a)] may be added to the list under this section, except that the prohibition of this sentence shall not apply to any pollutant which independently meets the listing criteria of this paragraph and is a precursor to a pollutant which is listed under section 108(a) [42 USCS § 7408(a)] or to

any pollutant which is in a class of pollutants listed under such section. No substance, practice, process or activity regulated under title VI of this Act [42 USCS §§ 7671 et seq.] shall be subject to regulation under this section solely due to its adverse effects on the environment.

(3) Petitions to modify the list.

(A) Beginning at any time after 6 months after the date of enactment of the Clean Air Act Amendments of 1990, any person may petition the Administrator to modify the list of hazardous air pollutants under this subsection by adding or deleting a substance or, in case of listed pollutants without CAS numbers (other than coke oven emissions, mineral fibers, or polycyclic organic matter) removing certain unique substances. Within 18 months after receipt of a petition, the Administrator shall either grant or deny the petition by publishing a written explanation of the reasons for the Administrator's decision. Any such petition shall include a showing by the petitioner that there is adequate data on the health or environmental defects [effects] of the pollutant or other evidence adequate to support the petition. The Administrator may not deny a petition solely on the basis of inadequate resources or time for review.

(B) The Administrator shall add a substance to the list upon a showing by the petitioner or on the Administrator's own determination that the substance is an air pollutant and that emissions, ambient concentrations, bioaccumulation or deposition of the substance are known to cause or may reasonably be anticipated to cause adverse effects to human health or adverse environmental effects.

(C) The Administrator shall delete a substance from the list upon a showing by the petitioner or on the Administrator's own determination that there is adequate data on the health and environmental effects of the substance to determine that emissions, ambient concentrations, bioaccumulation or deposition of the substance may not reasonably be anticipated to cause any adverse effects to the human health or adverse environmental effects.

(D) The Administrator shall delete one or more unique chemical substances that contain a listed hazardous air pollutant not having a CAS number (other than coke oven emissions, mineral fibers, or polycyclic organic matter) upon a showing by the petitioner or on the Administrator's own determination that such unique chemical substances that contain the named chemical of such listed hazardous air pollutant meet the deletion requirements of subparagraph (C). The Administrator must grant or deny a deletion petition prior to promulgating any emission standards pursuant to subsection (d) applicable to any source category or subcategory of a listed hazardous air pollutant without a CAS number listed under subsection (b) for which a deletion petition has been filed within 12 months of the date of enactment of the Clean Air Act Amendments of 1990.

(4) Further information. If the Administrator determines that information on the health or environmental effects of a substance is not sufficient to make a determination required by this subsection, the Administrator may use any authority available to the Administrator to acquire such information.

(5) Test methods. The Administrator may establish, by rule, test measures and other analytic procedures for monitoring and measuring emissions,

ambient concentrations, deposition, and bioaccumulation of hazardous air pollutants.

(6) Prevention of significant deterioration. The provisions of part C [42 USCS §§ 7581 et seq.] (prevention of significant deterioration) shall not apply to pollutants listed under this section.

(7) Lead. The Administrator may not list elemental lead as a hazardous air pollutant under this subsection.

(c) List of source categories.

(1) In general. Not later than 12 months after the date of enactment of the Clean Air Act Amendments of 1990, the Administrator shall publish, and shall from time to time, but no less often than every 8 years, revise, if appropriate, in response to public comment or new information, a list of all categories and subcategories of major sources and area sources (listed under paragraph (3)) of the air pollutants listed pursuant to subsection (b). To the extent practicable, the categories and subcategories listed under this subsection shall be consistent with the list of source categories established pursuant to section 111 and part C [42 USCS §§ 7411, 7581 et seq.]. Nothing in the preceding sentence limits the Administrator's authority to establish subcategories under this section, as appropriate.

(2) Requirement for emissions standards. For the categories and subcategories the Administrator lists, the Administrator shall establish emissions standards under subsection (d), according to the schedule in this subsection and subsection (e).

(3) Area sources. The Administrator shall list under this subsection each category or subcategory of

area sources which the Administrator finds presents a threat of adverse effects to human health or the environment (by such sources individually or in the aggregate) warranting regulation under this section. The Administrator shall, not later than 5 years after the date of enactment of the Clean Air Act Amendments of 1990 and pursuant to subsection (k)(3)(B), list, based on actual or estimated aggregate emissions of a listed pollutant or pollutants, sufficient categories or subcategories of area sources to ensure that area sources representing 90 percent of the area source emissions of the 30 hazardous air pollutants that present the greatest threat to public health in the largest number of urban areas are subject to regulation under this section. Such regulations shall be promulgated not later than 10 years after such date of enactment.

(4) Previously regulated categories. The Administrator may, in the Administrator's discretion, list any category or subcategory of sources previously regulated under this section as in effect before the date of enactment of the Clean Air Act Amendments of 1990.

(5) Additional categories. In addition to those categories and subcategories of sources listed for regulation pursuant to paragraphs (1) and (3), the Administrator may at any time list additional categories and subcategories of sources of hazardous air pollutants according to the same criteria for listing applicable under such paragraphs. In the case of source categories and subcategories listed after publication of the initial list required under paragraph (1) or (3), emission standards under subsection (d) for the category or subcategory shall be promulgated within 10 years after the date of enactment of the

Clean Air Act Amendments of 1990, or within 2 years after the date on which such category or subcategory is listed, whichever is later.

(6) Specific pollutants. With respect to alkylated lead compounds, polycyclic organic matter, hexachlorobenzene, mercury, polychlorinated biphenyls, 2,3,7,8-tetrachlorodibenzofurans and 2,3,7,8-tetrachlorodibenzo-p-dioxin, the Administrator shall, not later than 5 years after the date of enactment of the Clean Air Act Amendments of 1990, list categories and subcategories of sources assuring that sources accounting for not less than 90 per centum of the aggregate emissions of each such pollutant are subject to standards under subsection (d)(2) or (d)(4). Such standards shall be promulgated not later than 10 years after such date of enactment. This paragraph shall not be construed to require the Administrator to promulgate standards for such pollutants emitted by electric utility steam generating units.

(7) Research facilities. The Administrator shall establish a separate category covering research or laboratory facilities, as necessary to assure the equitable treatment of such facilities. For purposes of this section, "research or laboratory facility" means any stationary source whose primary purpose is to conduct research and development into new processes and products, where such source is operated under the close supervision of technically trained personnel and is not engaged in the manufacture of products for commercial sale in commerce, except in a de minimis manner.

(8) Boat manufacturing. When establishing emissions standards for styrene, the Administrator shall list boat manufacturing as a separate subcategory unless the Administrator finds that such listing would

be inconsistent with the goals and requirements of this Act.

(9) Deletions from the list.

(A) Where the sole reason for the inclusion of a source category on the list required under this subsection is the emission of a unique chemical substance, the Administrator shall delete the source category from the list if it is appropriate because of action taken under either subparagraphs (C) or (D) of subsection (b)(3).

(B) The Administrator may delete any source category from the list under this subsection, on petition of any person or on the Administrator's own motion, whenever the Administrator makes the following determination or determinations, as applicable:

(i) In the case of hazardous air pollutants emitted by sources in the category that may result in cancer in humans, a determination that no source in the category (or group of sources in the case of area sources) emits such hazardous air pollutants in quantities which may cause a lifetime risk of cancer greater than one in one million to the individual in the population who is most exposed to emissions of such pollutants from the source (or group of sources in the case of area sources).

(ii) In the case of hazardous air pollutants that may result in adverse health effects in humans other than cancer or adverse environmental effects, a determination that emissions from no source in the category or subcategory concerned (or group of sources in the case of area sources) exceed a level which is adequate to protect public health with an ample margin of safety and no adverse environmental effect

will result from emissions from any source (or from a group of sources in the case of area sources).

The Administrator shall grant or deny a petition under this paragraph within 1 year after the petition is filed.

(d) Emission standards.

(1) In general. The Administrator shall promulgate regulations establishing emission standards for each category or subcategory of major sources and area sources of hazardous air pollutants listed for regulation pursuant to subsection (c) in accordance with the schedules provided in subsections (c) and (e). The Administrator may distinguish among classes, types, and sizes of sources within a category or subcategory in establishing such standards except that, there shall be no delay in the compliance date for any standard applicable to any source under subsection (i) as the result of the authority provided by this sentence.

(2) Standards and methods. Emissions standards promulgated under this subsection and applicable to new or existing sources of hazardous air pollutants shall require the maximum degree of reduction in emissions of the hazardous air pollutants subject to this section (including a prohibition on such emissions, where achievable) that the Administrator, taking into consideration the cost of achieving such emission reduction, and any non-air quality health and environmental impacts and energy requirements, determines is achievable for new or existing sources in the category or subcategory to which such emission standard applies, through application of measures, processes, methods, systems or techniques including, but not limited to, measures which—

(A) reduce the volume of, or eliminate emissions of, such pollutants through process changes, substitution of materials or other modifications,

(B) enclose systems or processes to eliminate emissions,

(C) collect, capture or treat such pollutants when released from a process, stack, storage or fugitive emissions point,

(D) are design, equipment, work practice, or operational standards (including requirements for operator training or certification) as provided in subsection (h), or

(E) are a combination of the above.

None of the measures described in subparagraphs (A) through (D) shall, consistent with the provisions of section 114(c) [42 USCS § 7414(c)], in any way compromise any United States patent or United States trademark right, or any confidential business information, or any trade secret or any other intellectual property right.

(3) New and existing sources. The maximum degree of reduction in emissions that is deemed achievable for new sources in a category or subcategory shall not be less stringent than the emission control that is achieved in practice by the best controlled similar source, as determined by the Administrator. Emission standards promulgated under this sub-section for existing sources in a category or subcategory may be less stringent than standards for new sources in the same category or subcategory but shall not be less stringent, and may be more stringent than—

(A) the average emission limitation achieved by the best performing 12 percent of the existing sources (for which the Administrator has emissions information), excluding those sources that have, within 18 months before the emission standard is proposed or within 30 months before such standard is promulgated, whichever is later, first achieved a level of emission rate or emission reduction which complies, or would comply if the source is not subject to such standard, with the lowest achievable emission rate (as defined by section 171 [42 USCS § 7501]) applicable to the source category and prevailing at the time, in the category or subcategory for categories and subcategories with 30 or more sources, or

(B) the average emission limitation achieved by the best performing 5 sources (for which the Administrator has or could reasonably obtain emissions information) in the category or subcategory for categories or subcategories with fewer than 30 sources.

(4) Health threshold. With respect to pollutants for which a health threshold has been established, the Administrator may consider such threshold level, with an ample margin of safety, when establishing emission standards under this subsection.

(5) Alternative standard for area sources. With respect only to categories and subcategories of area sources listed pursuant to subsection (c), the Administrator may, in lieu of the authorities provided in paragraph (2) and subsection (f), elect to promulgate standards or requirements applicable to sources in such categories or subcategories which provide for the use of generally available control technologies or management practices by such sources to reduce emissions of hazardous air pollutants.

(6) Review and revision. The Administrator shall review, and revise as necessary (taking into account developments in practices, processes, and control technologies), emission standards promulgated under this section no less often than every 8 years.

(7) Other requirements preserved. No emission standard or other requirement promulgated under this section shall be interpreted, construed or applied to diminish or replace the requirements of a more stringent emission limitation or other applicable requirement established pursuant to section 111, part C or D [42 USCS § 7411, §§ 7470 et seq. or §§ 7501 et seq.], or other authority of this Act or a standard issued under State authority.

(8) Coke ovens.

(A) Not later than December 31, 1992, the Administrator shall promulgate regulations establishing emission standards under paragraphs (2) and (3) of this subsection for coke oven batteries. In establishing such standards, the Administrator shall evaluate—

(i) the use of sodium silicate (or equivalent) luting compounds to prevent door leaks, and other operating practices and technologies for their effectiveness in reducing coke oven emissions, and their suitability for use on new and existing coke oven batteries, taking into account costs and reasonable commercial door warranties; and

(ii) as a basis for emission standards under this subsection for new coke oven batteries that begin construc-tion after the date of proposal of such standards, the Jewell design Thompson non-recovery coke oven batteries and other non-recovery coke oven technologies, and other appropriate emission control and coke production technologies, as to their

effectiveness in reducing coke oven emissions and their capability for production of steel quality coke.

Such regulations shall require at a minimum that coke oven batteries will not exceed 8 per centum leaking doors, 1 per centum leaking lids, 5 per centum leaking offtakes, and 16 seconds visible emissions per charge, with no exclusion for emissions during the period after the closing of self-sealing oven doors. Notwithstanding subsection (i), the compliance date for such emission standards for existing coke oven batteries shall be December 31, 1995.

(B) The Administrator shall promulgate work practice regulations under this subsection for coke oven batteries requiring, as appropriate—

(i) the use of sodium silicate (or equivalent) luting compounds, if the Administrator determines that use of sodium silicate is an effective means of emissions control and is achievable, taking into account costs and reasonable commercial warranties for doors and related equipment; and

(ii) door and jam cleaning practices. Notwithstanding subsection (i), the compliance date for such work practice regulations for coke oven batteries shall be not later than the date 3 years after the date of enactment of the Clean Air Act Amendments of 1990.

(C) For coke oven batteries electing to qualify for an extension of the compliance date for standards promulgated under subsection (f) in accordance with subsection (i)(8), the emission standards under this subsection for coke oven batteries shall require that coke oven batteries not exceed 8 per centum leaking doors, 1 per centum leaking lids, 5 per centum leaking offtakes, and 16 seconds visible emissions per charge,

with no exclusion for emissions during the period after the closing of self-sealing doors. Notwithstanding subsection (i), the compliance date for such emission standards for existing coke oven batteries seeking an extension shall be not later than the date 3 years after the date of enactment of the Clean Air Act Amendments of 1990.

(9) Sources licensed by the Nuclear Regulatory Commission. No standard for radionuclide emissions from any category or subcategory of facilities licensed by the Nuclear Regulatory Commission (or an Agreement State) is required to be promulgated under this section if the Administrator determines, by rule, and after consultation with the Nuclear Regulatory Commission, that the regulatory program established by the Nuclear Regulatory Commission pursuant to the Atomic Energy Act for such category or subcategory provides an ample margin of safety to protect the public health. Nothing in this subsection shall preclude or deny the right of any State or political subdivision thereof to adopt or enforce any standard or limitation respecting emissions of radionuclides which is more stringent than the standard or limitation in effect under section 111 [42 USCS § 7411] or this section.

(10) Effective date. Emission standards or other regulations promulgated under this subsection shall be effective upon promulgation.

(e) Schedule for standards and review.

(1) In general. The Administrator shall promulgate regulations establishing emission standards for categories and subcategories of sources initially listed for regulation pursuant to subsection (c)(1) as expeditiously as practicable, assuring that—

(A) emission standards for not less than 40 categories and subcategories (not counting coke oven batteries) shall be promulgated not later than 2 years after the date of enactment of the Clean Air Act Amendments of 1990;

(B) emission standards for coke oven batteries shall be promulgated not later than December 31, 1992;

(C) emission standards for 25 per centum of the listed categories and subcategories shall be promulgated not later than 4 years after the date of enactment of the Clean Air Act Amendments of 1990;

(D) emission standards for an additional 25 per centum of the listed categories and subcategories shall be promulgated not later than 7 years after the date of enactment of the Clean Air Act Amendments of 1990; and

(E) emission standards for all categories and subcategories shall be promulgated not later than 10 years after the date of enactment of the Clean Air Act Amendments of 1990.

(2) In determining priorities for promulgating standards under subsection (d), the Administrator shall consider—

(A) the known or anticipated adverse effects of such pollutants on public health and the environment;

(B) the quantity and location of emissions or reasonably anticipated emissions of hazardous air pollutants that each category or subcategory will emit; and

(C) the efficiency of grouping categories or subcategories according to the pollutants emitted, or the processes or technologies used.

(3) Published schedule. Not later than 24 months after the date of enactment of the Clean Air Act Amendments of 1990 and after opportunity for comment, the Administrator shall publish a schedule establishing a date for the promulgation of emission standards for each category and subcategory of sources listed pursuant to subsection (c)(1) and (3) which shall be consistent with the requirements of paragraphs (1) and (2). The determination of priorities for the promulgation of standards pursuant to this paragraph is not a rulemaking and shall not be subject to judicial review, except that, failure to promulgate any standard pursuant to the schedule established by this paragraph shall be subject to review under section 304 of this Act [42 USCS § 7604].

(4) Judicial review. Notwithstanding section 307 of this Act [42 USCS § 7607], no action of the Administrator adding a pollutant to the list under subsection (b) or listing a source category or subcategory under subsection (c) shall be a final agency action subject to judicial review, except that any such action may be reviewed under such section 307 [42 USCS § 7607] when the Administrator issues emission standards for such pollutant or category.

(5) Publicly owned treatment works. The Administrator shall promulgate standards pursuant to subsection (d) applicable to publicly owned treatment works (as defined in title II of the Federal Water Pollution Control Act [33 USCS §§ 1281 et seq.]) not later than 5 years after the date of enactment of the Clean Air Act Amendments of 1990.

(f) Standard to protect health and the environment.

(1) Report. Not later than 6 years after the date of enactment of the Clean Air Act Amendments of 1990

the Administrator shall investigate and report, after consultation with the Surgeon General and after opportunity for public comment, to Congress on—

(A) methods of calculating the risk to public health remaining, or likely to remain, from sources subject to regu-lation under this section after the application of standards under subsection (d);

(B) the public health significance of such estimated remaining risk and the technologically and commercially available methods and costs of reducing such risks;

(C) the actual health effects with respect to persons living in the vicinity of sources, any available epidemiological or other health studies, risks presented by background concentrations of hazardous air pollutants, any uncertainties in risk assessment methodology or other health assessment technique, and any negative health or environmental consequences to the community of efforts to reduce such risks; and

(D) recommendations as to legislation regarding such remaining risk.

(2) Emission standards.

(A) If Congress does not act on any recommendation submitted under paragraph (1), the Administrator shall, within 8 years after promulgation of standards for each category or subcategory of sources pursuant to subsection (d), promulgate standards for such category or subcategory if promulgation of such standards is required in order to pro-vide an ample margin of safety to protect public health in accordance with this section (as in effect before the date of enactment of the Clean

Air Act Amendments of 1990) or to prevent, taking into consideration costs, energy, safety, and other relevant factors, an adverse environmental effect. Emission standards promulgated under this subsection shall provide an ample margin of safety to protect public health in accordance with this section (as in effect before the date of enactment of the Clean Air Act Amendments of 1990), unless the Administrator determines that a more stringent standard is necessary to prevent, taking into consideration costs, energy, safety, and other relevant factors, an adverse environmental effect. If standards promulgated pursuant to subsection (d) and applicable to a category or subcategory of sources emitting a pollutant (or pollutants) classified as a known, probable or possible human carcinogen do not reduce lifetime excess cancer risks to the individual most exposed to emissions from a source in the category or subcategory to less than one in one million, the Administrator shall promulgate standards under this subsection for such source category.

(B) Nothing in subparagraph (A) or in any other provision of this section shall be construed as affecting, or applying to the Administrator's interpretation of this section, as in effect before the date of enactment of the Clean Air Act Amendments of 1990 and set forth in the Federal Register of September 14, 1989 (54 Federal Register 38044).

(C) The Administrator shall determine whether or not to promulgate such standards and, if the Administrator decides to promulgate such standards, shall promulgate the standards 8 years after promulgation of the standards un-der subsection (d) for each source category or subcategory concerned. In the case of categories or subcategories for which

standards under subsection (d) are required to be promulgated within 2 years after the date of enactment of the Clean Air Act Amendments of 1990, the Administrator shall have 9 years after promulgation of the standards under subsection (d) to make the determination under the preceding sentence and, if required, to promulgate the standards under this paragraph.

(3) Effective date. Any emission standard established pursuant to this subsection shall become effective upon promulgation.

(4) Prohibition. No air pollutant to which a standard under this subsection applies may be emitted from any stationary source in violation of such standard, except that in the case of an existing source—

(A) such standard shall not apply until 90 days after its effective date, and

(B) the Administrator may grant a waiver permitting such source a period of up to 2 years after the effective date of a standard to comply with the standard if the Administrator finds that such period is necessary for the installation of controls and that steps will be taken during the period of the waiver to assure that the health of persons will be protected from imminent endangerment.

(5) Area sources. The Administrator shall not be required to conduct any review under this subsection or promulgate emission limitations under this subsection for any category or subcategory of area sources that is listed pursuant to subsection (c)(3) and for which an emission standard is promulgated pursuant to subsection (d)(5).

(6) Unique chemical substances. In establishing standards for the control of unique chemical substances of listed pollutants without CAS numbers under this subsection, the Administrator shall establish such standards with respect to the health and environmental effects of the substances actually emitted by sources and direct transformation byproducts of such emissions in the categories and subcategories.

(g) Modifications.

(1) Offsets.

(A) A physical change in, or change in the method of operation of, a major source which results in a greater than de minimis increase in actual emissions of a hazardous air pollutant shall not be considered a modification, if such increase in the quantity of actual emissions of any hazardous air pollutant from such source will be offset by an equal or greater decrease in the quantity of emissions of another hazardous air pollutant (or pollutants) from such source which is deemed more hazardous, pursuant to guidance issued by the Administrator under subparagraph (B). The owner or operator of such source shall submit a showing to the Administrator (or the State) that such increase has been offset under the preceding sentence.

(B) The Administrator shall, after notice and opportunity for comment and not later than 18 months after the date of enactment of the Clean Air Act Amendments of 1990, publish guidance with respect to implementation of this subsection. Such guidance shall include an identification, to the extent practicable, of the relative hazard to human health resulting from emissions to the ambient air of each of

the pollutants listed under subsection (b) sufficient to facilitate the offset showing authorized by subparagraph (A). Such guidance shall not authorize offsets between pollutants where the increased pollutant (or more than one pollutant in a stream of pollutants) causes adverse effects to human health for which no safety threshold for exposure can be determined unless there are corresponding decreases in such types of pollutant(s).

(2) Construction, reconstruction and modifications.

(A) After the effective date of a permit program under title V [42 USCS §§ 7661 et seq.] in any State, no person may modify a major source of hazardous air pollutants in such State, unless the Administrator (or the State) deter-mines that the maximum achievable control technology emission limitation under this section for existing sources will be met. Such determination shall be made on a case-by-case basis where no applicable emissions limitations have been established by the Administrator.

(B) After the effective date of a permit program under title V [42 USCS §§ 7661 et seq.] in any State, no person may construct or reconstruct any major source of hazardous air pollutants, unless the Administrator (or the State) determines that the maximum achievable control technology emission limitation under this section for new sources will be met. Such determination shall be made on a case-by-case basis where no applicable emission limitations have been established by the Administrator.

(3) Procedures for modifications. The Administrator (or the State) shall establish reasonable procedures for assuring that the requirements applying to

modifications under this section are reflected in the permit.

(h) Work practice standards and other requirements.

(1) In general. For purposes of this section, if it is not feasible in the judgment of the Administrator to prescribe or enforce an emission standard for control of a hazardous air pollutant or pollutants, the Administrator may, in lieu thereof, promulgate a design, equipment, work practice, or operational standard, or combination thereof, which in the Administrator's judgment is consistent with the provisions of subsection (d) or (f). In the event the Administrator promulgates a design or equipment standard under this subsection, the Administrator shall include as part of such standard such requirements as will assure the proper operation and maintenance of any such element of design or equipment.

(2) Definition. For the purpose of this subsection, the phrase "not feasible to prescribe or enforce an emission standard" means any situation in which the Administrator determines that—

(A) a hazardous air pollutant or pollutants cannot be emitted through a conveyance designed and constructed to emit or capture such pollutant, or that any requirement for, or use of, such a conveyance would be inconsistent with any Federal, State or local law, or

(B) the application of measurement methodology to a particular class of sources is not practicable due to technological and economic limitations.

(3) Alternative standard. If after notice and opportunity for comment, the owner or operator of any

source establishes to the satisfaction of the Administrator that an alternative means of emission limitation will achieve a reduction in emissions of any air pollutant at least equivalent to the reduction in emissions of such pollutant achieved under the requirements of paragraph (1), the Administrator shall permit the use of such alternative by the source for purposes of compliance with this section with respect to such pollutant.

(4) Numerical standard required. Any standard promulgated under paragraph (1) shall be promulgated in terms of an emission standard whenever it is feasible to promulgate and enforce a standard in such terms.

(i) Schedule for compliance.

(1) Preconstruction and operating requirements. After the effective date of any emission standard, limitation, or regulation under subsection (d), (f) or (h), no person may construct any new major source or reconstruct any existing major source subject to such emission standard, regulation or limitation unless the Administrator (or a State with a permit program approved under title V [42 USCS §§ 7661 et seq.]) determines that such source, if properly constructed, reconstructed and operated, will comply with the standard, regulation or limitation.

(2) Special rule. Notwithstanding the requirements of paragraph (1), a new source which commences construction of reconstruction after a standard, limitation or regulation applicable to such source is proposed and before such standard, limitation or regulation is promulgated shall not be required to comply with such promulgated standard until the date 3 years after the date of promulgation if—

(A) the promulgated standard, limitation or regulation is more stringent than the standard, limitation or regulation proposed; and

(B) the source complies with the standard, limitation, or regulation as proposed during the 3-year period immediately after promulgation.

(3) Compliance schedule for existing sources.

(A) After the effective date of any emissions standard, limitation or regulation promulgated under this section and applicable to a source, no person may operate such source in violation of such standard, limitation or regulation except, in the case of an existing source, the Administrator shall establish a compliance date or dates for each category or subcategory of existing sources, which shall provide for compliance as expeditiously as practicable, but in no event later than 3 years after the effective date of such standard, except as provided in subparagraph (B) and paragraphs (4) through (8).

(B) The Administrator (or a State with a program approved under title V [42 USCS §§ 7661 et seq.]) may issue a permit that grants an extension permitting an existing source up to 1 additional year to comply with standards under subsection (d) if such additional period is necessary for the installation of controls. An additional extension of up to 3 years may be added for mining waste operations, if the 4-year compliance time is insufficient to dry and cover mining waste in order to reduce emissions of any pollutant listed under subsection (b).

(4) Presidential exemption. The President may exempt any stationary source from compliance with any standard or limitation under this section for a period of not more than 2 years if the President

determines that the technology to implement such standard is not available and that it is in the national security interests of the United States to do so. An exemption under this paragraph may be extended for 1 or more additional periods, each period not to exceed 2 years. The President shall report to Congress with respect to each exemption (or extension thereof) made under this para-graph.

(5) Early reduction.

(A) The Administrator (or a State acting pursuant to a permit program approved under title V [42 USCS §§ 7661 et seq.]) shall issue a permit allowing an existing source, for which the owner or operator demonstrates that the source has achieved a reduction of 90 per centum or more in emissions of hazardous air pollutants (95 per centum in the case of hazardous air pollutants which are particulates) from the source, to meet an alternative emission limitation reflecting such reduction in lieu of an emission limitation promulgated under subsection (d) for a period of 6 years from the compliance date for the otherwise applicable standard, provided that such reduction is achieved before the other-wise applicable standard under subsection (d) is first proposed. Nothing in this paragraph shall preclude a State from requiring reductions in excess of those specified in this subparagraph as a condition of granting the extension authorized by the previous sentence.

(B) An existing source which achieves the reduction referred to in subparagraph (A) after the proposal of an applicable standard but before January 1, 1994, may qualify under subparagraph (A), if the source makes an enforceable commitment to achieve such reduction before the proposal of the standard.

Such commitment shall be en-forceable to the same extent as a regulation under this section.

(C) The reduction shall be determined with respect to verifiable and actual emissions in a base year not earlier than calendar year 1987, provided that, there is no evidence that emissions in the base year are artificially or substantially greater than emissions in other years prior to implementation of emissions reduction measures. The Administrator may allow a source to use a baseline year of 1985 or 1986 provided that the source can demonstrate to the satisfaction of the Administrator that emissions data for the source reflects verifiable data based on information for such source, received by the Administrator prior to the enactment of the Clean Air Act Amendments of 1990, pursuant to an information request issued under section 114 [42 USCS § 7414].

(D) For each source granted an alternative emission limitation under this paragraph there shall be established by a permit issued pursuant to title V [42 USCS §§ 7661 et seq.] an enforceable emission limitation for hazardous air pollutants reflecting the reduction which qualifies the source for an alternative emission limitation under this paragraph. An alternative emission limitation under this paragraph shall not be available with respect to standards or requirements promulgated pursuant to subsection (f) and the Administrator shall, for the purpose of determining whether a standard under subsection (f) is necessary, review emissions from sources granted an alternative emission limitation under this paragraph at the same time that other sources in the category or subcategory are reviewed.

(E) With respect to pollutants for which high risks of adverse public health effects may be

associated with exposure to small quantities including, but not limited to, chlorinated dioxins and furans, the Administrator shall by regulation limit the use of offsetting reductions in emissions of other hazardous air pollutants from the source as counting toward the 90 per centum reduction in such high-risk pollutants qualifying for an alternative emissions limitation under this paragraph.

(6) Other reductions. Notwithstanding the requirements of this section, no existing source that has installed—

(A) best available control technology (as defined in section 169(3) [42 USCS § 7479(3)]), or

(B) technology required to meet a lowest achievable emission rate (as defined in section 171 [42 USCS § 7501]), prior to the promulgation of a standard under this section applicable to such source and the same pollutant (or stream of pollutants) controlled pursuant to an action described in subparagraph (A) or (B) shall be required to comply with such standard under this section until the date 5 years after the date on which such installation or reduction has been achieved, as determined by the Administrator. The Administrator may issue such rules and guidance as are necessary to implement this paragraph.

(7) Extension for new sources. A source for which construction or reconstruction is commenced after the date an emission standard applicable to such source is proposed pursuant to subsection (d) but before the date an emission standard applicable to such source is proposed pursuant to subsection (f) shall not be required to comply with the emission standard under subsection (f) until the date 10 years after the date construction or reconstruction is commenced.

(8) Coke oven.

(A) Any coke oven battery that complies with the emission limitations established under subsection (d)(8)(C), subparagraph (B), and subparagraph (C), and complies with the provisions of subparagraph (E), shall not be required to achieve emission limitations promulgated under subsection (f) until January 1, 2020.

(B) (i) Not later than December 31, 1992, the Administrator shall promulgate emission limitations for coke oven emissions from coke oven batteries. Notwithstanding paragraph (3) of this subsection, the compliance date for such emission limitations for existing coke oven batteries shall be January 1, 1998. Such emission limitations shall reflect the lowest achievable emission rate as defined in section 171 [42 USCS § 7501] for a coke oven battery that is rebuilt or a replacement at a coke oven plant for an existing battery. Such emission limitations shall be no less stringent than—

(I) 3 per centum leaking doors (5 per centum leaking doors for six meter batteries);

(II) 1 per centum leaking lids;

(III) 4 per centum leaking offtakes; and

(IV) 16 seconds visible emissions per charge,

with an exclusion for emissions during the period after the closing of self-sealing oven doors (or the total mass emissions equivalent). The rulemaking in which such emission limitations are promulgated shall also establish an appropriate measurement methodology for determining compliance with such emission limitations, and shall establish such emission limitations in terms of an equivalent level of mass

emissions reduction from a coke oven battery, unless the Administrator finds that such a mass emissions standard would not be practicable or enforceable. Such measurement methodology, to the extent it measures leaking doors, shall take into consideration alternative test methods that reflect the best technology and practices actually applied in the affected industries, and shall assure that the final test methods are consistent with the performance of such best technology and practices.

(ii) If the Administrator fails to promulgate such emission limitations under this subparagraph prior to the effective date of such emission limitations, the emission limitations applicable to coke oven batteries under this sub-paragraph shall be—

(I) 3 per centum leaking doors (5 per centum leaking doors for six meter batteries);

(II) 1 per centum leaking lids;

(III) 4 per centum leaking offtakes; and

(IV) 16 seconds visible emissions per charge,

or the total mass emissions equivalent (if the total mass emissions equivalent is determined to be practicable and enforceable), with no exclusion for emissions during the period after the closing of self-sealing oven doors.

(C) Not later than January 1, 2007, the Administrator shall review the emission limitations promulgated under subparagraph (B) and revise, as necessary, such emission limitations to reflect the lowest achievable emission rate as defined in section 171 [42 USCS § 7501] at the time for a coke oven battery that is rebuilt or a replacement at a coke oven

plant for an existing battery. Such emission limitations shall be no less stringent than the emission limitation promulgated under subparagraph (B). Notwithstanding paragraph (2) of this subsection, the compliance date for such emission limitations for existing coke oven batteries shall be January 1, 2010.

(D) At any time prior to January 1, 1998, the owner or operator of any coke oven battery may elect to comply with emission limitations promulgated under subsection (f) by the date such emission limitations would otherwise apply to such coke oven battery, in lieu of the emission limitations and the compliance dates provided under subparagraphs (B) and (C) of this paragraph. Any such owner or operator shall be legally bound to comply with such emission limitations promulgated under subsection (f) with respect to such coke oven battery as of January 1, 2003. If no such emission limitations have been promulgated for such coke oven battery, the Administrator shall promulgate such emission limitations in accordance with subsection (f) for such coke oven battery.

(E) Coke oven batteries qualifying for an extension under subparagraph (A) shall make available not later than January 1, 2000, to the surrounding communities the results of any risk assessment performed by the Administrator to determine the appropriate level of any emission standard established by the Administrator pursuant to subsection (f).

(F) Notwithstanding the provisions of this section, reconstruction of any source of coke oven emissions qualifying for an extension under this paragraph shall not subject such source to emission limitations under subsection (f) more stringent than

those established under subparagraphs (B) and (C) until January 1, 2020. For the purposes of this subparagraph, the term "reconstruction" includes the replacement of existing coke oven battery capacity with new coke oven batteries of comparable or lower capacity and lower potential emissions.

(j) Equivalent emission limitation by permit.

(1) Effective date. The requirements of this subsection shall apply in each State beginning on the effective date of a permit program established pursuant to title V [42 USCS §§ 7661 et seq.] in such State, but not prior to the date 42 months after the date of enactment of the Clean Air Act Amendments of 1990.

(2) Failure to promulgate a standard. In the event that the Administrator fails to promulgate a standard for a cate-gory or subcategory of major sources by the date established pursuant to subsection (e)(1) and (3), and beginning 18 months after such date (but not prior to the effective date of a permit program under title V [42 USCS §§ 7661 et seq.]), the owner or operator of any major source in such category or subcategory shall submit a permit application under paragraph (3) and such owner or operator shall also comply with paragraphs (5) and (6).

(3) Application. By the date established by paragraph (2), the owner or operator of a major source subject to this subsection shall file an application for a permit. If the owner or operator of a source has submitted a timely and complete application for a permit required by this subsection, any failure to have a permit shall not be a violation of paragraph (2), unless the delay in final action is due to the failure of the applicant to timely submit information required or

requested to process the application. The Administrator shall not later than 18 months after the date of enactment of the Clean Air Act Amendments of 1990, and after notice and opportunity for comment, establish requirements for applications under this subsection including a standard application form and criteria for determining in a timely manner the completeness of applications.

(4) Review and approval. Permit applications submitted under this subsection shall be reviewed and approved or disapproved according to the provisions of section 505 [42 USCS § 7605]. In the event that the Administrator (or the State) disapproves a permit application submitted under this subsection or determines that the application is incomplete, the applicant shall have up to 6 months to revise the application to meet the objections of the Administrator (or the State).

(5) Emission limitation. The permit shall be issued pursuant to title V [42 USCS §§ 7661 et seq.] and shall contain emission limitations for the hazardous air pollutants subject to regulation under this section and emitted by the source that the Administrator (or the State) determines, on a case-by-case basis, to be equivalent to the limitation that would apply to such source if an emission standard had been promulgated in a timely manner under subsection (d). In the alternative, if the applicable criteria are met, the permit may contain an emissions limitation established according to the provisions of subsection (i)(5). For purposes of the preceding sentence, the reduction required by subsection (i)(5)(A) shall be achieved by the date on which the relevant standard should have been promulgated under subsection (d). No such pollutant may be emitted in amounts

exceeding an emission limitation contained in a permit immediately for new sources and, as expeditiously as practicable, but not later than the date 3 years after the permit is issued for existing sources or such other compliance date as would apply under subsection (i).

(6) Applicability of subsequent standards. If the Administrator promulgates an emission standard that is applicable to the major source prior to the date on which a permit application is approved, the emission limitation in the permit shall reflect the promulgated standard rather than the emission limitation determined pursuant to paragraph (5), pro-vided that the source shall have the compliance period provided under subsection (i). If the Administrator promulgates a standard under subsection (d) that would be applicable to the source in lieu of the emission limitation established by permit under this subsection after the date on which the permit has been issued, the Administrator (or the State) shall revise such permit upon the next renewal to reflect the standard promulgated by the Administrator providing such source a reasonable time to comply, but no longer than 8 years after such standard is promulgated or 8 years after the date on which the source is first required to comply with the emissions limitation established by paragraph (5), which-ever is earlier.

(k) Area source program.

(1) Findings and purpose. The Congress finds that emissions of hazardous air pollutants from area sources may individually, or in the aggregate, present significant risks to public health in urban areas. Considering the large number of persons exposed and the risks of carcinogenic and other adverse health effects from hazardous air pollutants, ambient concentrations characteristic of large urban areas

should be reduced to levels substantially below those currently experienced. It is the purpose of this subsection to achieve a substantial reduction in emissions of hazardous air pollutants from area sources and an equivalent reduction in the public health risks associated with such sources including a reduction of not less than 75 per centum in the incidence of cancer attributable to emissions from such sources.

(2) Research program. The Administrator shall, after consultation with State and local air pollution control officials, conduct a program of research with respect to sources of hazardous air pollutants in urban areas and shall include within such program—

(A) ambient monitoring for a broad range of hazardous air pollutants (including, but not limited to, volatile organic compounds, metals, pesticides and products of incomplete combustion) in a representative number of urban locations;

(B) analysis to characterize the sources of such pollution with a focus on area sources and the contribution that such sources make to public health risks from hazardous air pollutants; and

(C) consideration of atmospheric transformation and other factors which can elevate public health risks from such pollutants.

Health effects considered under this program shall include, but not be limited to, carcinogenicity, mutagenicity, teratogenicity, neurotoxicity, reproductive dysfunction and other acute and chronic effects including the role of such pollutants as precursors of ozone or acid aerosol formation. The Administrator shall report the preliminary results of such research

not later than 3 years after the date of enactment of the Clean Air Act Amendments of 1990.

(3) National strategy.

(A) Considering information collected pursuant to the monitoring program authorized by paragraph (2), the Administrator shall, not later than 5 years after the date of enactment of the Clean Air Act Amendments of 1990 and after notice and opportunity for public comment, prepare and transmit to the Congress a comprehensive strategy to control emissions of hazardous air pollutants from area sources in urban areas.

(B) The strategy shall—

(i) identify not less than 30 hazardous air pollutants which, as the result of emissions from area sources, present the greatest threat to public health in the largest number of urban areas and that are or will be listed pursuant to subsection (b), and

(ii) identify the source categories or subcategories emitting such pollutants that are or will be listed pursuant to subsection (c). When identifying categories and subcategories of sources under this subparagraph, the Administrator shall assure that sources accounting for 90 per centum or more of the aggregate emissions of each of the 30 identified hazardous air pollutants are subject to standards pursuant to subsection (d).

(C) The strategy shall include a schedule of specific actions to substantially reduce the public health risks posed by the release of hazardous air pollutants from area sources that will be implemented by the Administrator under the authority of this or other laws (including, but not limited to, the Toxic

Substances Control Act [15 USCS §§ 2601 et seq.], the Federal Insecticide, Fungicide and Rodenticide Act [7 USCS §§ 136 et seq.] and the Resource Conservation and Recovery Act [42 USCS §§ 6901 et seq.]) or by the States. The strategy shall achieve a reduction in the incidence of cancer attributable to exposure to hazardous air pollutants emitted by stationary sources of not less than 75 per centum, considering control of emissions of hazardous air pollutants from all stationary sources and resulting from measures implemented by the Administrator or by the States under this or other laws.

(D) The strategy may also identify research needs in monitoring, analytical methodology, modeling or pollution control techniques and recommendations for changes in law that would further the goals and objectives of this subsection.

(E) Nothing in this subsection shall be interpreted to preclude or delay implementation of actions with respect to area sources of hazardous air pollutants under consideration pursuant to this or any other law and that may be promulgated before the strategy is prepared.

(F) The Administrator shall implement the strategy as expeditiously as practicable assuring that all sources are in compliance with all requirements not later than 9 years after the date of enactment of the Clean Air Act Amend-ments of 1990.

(G) As part of such strategy the Administrator shall provide for ambient monitoring and emissions modeling in urban areas as appropriate to demonstrate that the goals and objectives of the strategy are being met.

(4) Areawide activities. In addition to the national urban air toxics strategy authorized by paragraph (3), the Administrator shall also encourage and support areawide strategies developed by State or local air pollution control agencies that are intended to reduce risks from emissions by area sources within a particular urban area. From the funds available for grants under this section, the Administrator shall set aside not less than 10 per centum to support areawide strategies addressing hazardous air pollutants emitted by area sources and shall award such funds on a demonstration basis to those States with innovative and effective strategies. At the request of State or local air pollution control officials, the Administrator shall prepare guidelines for control technologies or management practices which may be applicable to various categories or subcategories of area sources.

(5) Report. The Administrator shall report to the Congress at intervals not later than 8 and 12 years after the date of enactment of the Clean Air Act Amendments of 1990 on actions taken under this subsection and other parts of this Act to reduce the risk to public health posed by the release of hazardous air pollutants from area sources. The reports shall also identify specific metropolitan areas that continue to experience high risks to public health as the result of emissions from area sources.

(l) State programs.

(1) In general. Each State may develop and submit to the Administrator for approval a program for the implementation and enforcement (including a review of enforcement delegations previously granted) of emission standards and other requirements for air pollutants subject to this section or requirements for the prevention and mitigation of accidental releases

pursuant to subsection (r). A program submitted by a State under this subsection may provide for partial or complete delegation of the Administrator's authorities and responsibilities to implement and enforce emissions standards and prevention requirements but shall not include authority to set standards less stringent than those promulgated by the Administrator under this Act.

(2) Guidance. Not later than 12 months after the date of enactment of the Clean Air Act Amendments of 1990, the Administrator shall publish guidance that would be useful to the States in developing programs for submittal under this subsection. The guidance shall also provide for the registration of all facilities producing, processing, handling or storing any substance listed pursuant to subsection (r) in amounts greater than the threshold quantity. The Administrator shall include as an element in such guidance an optional program begun in 1986 for the review of high-risk point sources of air pollutants including, but not limited to, hazardous air pollutants listed pursuant to subsection (b).

(3) Technical assistance. The Administrator shall establish and maintain an air toxics clearinghouse and center to provide technical information and assistance to State and local agencies and, on a cost recovery basis, to others on control technology, health and ecological risk assessment, risk analysis, ambient monitoring and modeling, and emissions measurement and monitoring. The Administrator shall use the authority of section 103 [42 USCS § 7403] to ex-amine methods for preventing, measuring, and controlling emissions and evaluating associated health and ecological risks. Where appropriate, such activity shall be conducted with not-for-profit organizations. The

Administrator may conduct research on methods for preventing, measuring and controlling emissions and evaluating associated health and environment risks. All information collected under this paragraph shall be available to the public.

(4) Grants. Upon application of a State, the Administrator may make grants, subject to such terms and conditions as the Administrator deems appropriate, to such State for the purpose of assisting the State in developing and implementing a program for submittal and approval under this subsection. Programs assisted under this paragraph may include program elements addressing air pollutants or extremely hazardous substances other than those specifically subject to this section. Grants under this paragraph may include support for high-risk point source review as provided in paragraph (2) and support for the development and implementation of areawide area source programs pursuant to subsection (k).

(5) Approval or disapproval. Not later than 180 days after receiving a program submitted by a State, and after notice and opportunity for public comment, the Administrator shall either approve or disapprove such program. The Administrator shall disapprove any program submitted by a State, if the Administrator determines that—

(A) the authorities contained in the program are not adequate to assure compliance by all sources within the State with each applicable standard, regulation or requirement established by the Administrator under this section;

(B) adequate authority does not exist, or adequate resources are not available, to implement the program;

(C) the schedule for implementing the program and assuring compliance by affected sources is not sufficiently expeditious; or

(D) the program is otherwise not in compliance with the guidance issued by the Administrator under paragraph (2) or is not likely to satisfy, in whole or in part, the objectives of this Act.

If the Administrator disapproves a State program, the Administrator shall notify the State of any revisions or modifications necessary to obtain approval. The State may revise and resubmit the proposed program for review and approval pursuant to the provisions of this subsection.

(6) Withdrawal. Whenever the Administrator determines, after public hearing, that a State is not administering and enforcing a program approved pursuant to this subsection in accordance with the guidance published pursuant to paragraph (2) or the requirements of paragraph (5), the Administrator shall so notify the State and, if action which will assure prompt compliance is not taken within 90 days, the Administrator shall withdraw approval of the program. The Administrator shall not withdraw approval of any program unless the State shall have been notified and the reasons for withdrawal shall have been stated in writing and made public.

(7) Authority to enforce. Nothing in this subsection shall prohibit the Administrator from enforcing any applicable emission standard or requirement under this section.

(8) Local program. The Administrator may, after notice and opportunity for public comment, approve a program developed and submitted by a local air pollution control agency (after consultation with the

State) pursuant to this subsection and any such agency implementing an approved program may take any action authorized to be taken by a State under this section.

(9) Permit authority. Nothing in this subsection shall affect the authorities and obligations of the Administrator or the State under title V [42 USCS §§ 7661 et seq.].

(m) Atmospheric deposition to Great Lakes and coastal waters.

(1) Deposition assessment. The Administrator, in cooperation with the Under Secretary of Commerce for Oceans and Atmosphere, shall conduct a program to identify and assess the extent of atmospheric deposition of hazardous air pollutants (and in the discretion of the Administrator, other air pollutants) to the Great Lakes, the Chesapeake Bay, Lake Champlain and coastal waters. As part of such program, the Administrator shall—

(A) monitor the Great Lakes, the Chesapeake Bay, Lake Champlain and coastal waters, including monitoring of the Great Lakes through the monitoring network established pursuant to paragraph (2) of this subsection and de-signing and deploying an atmospheric monitoring network for coastal waters pursuant to paragraph (4);

(B) investigate the sources and deposition rates of atmospheric deposition of air pollutants (and their atmos-pheric transformation precursors);

(C) conduct research to develop and improve monitoring methods and to determine the relative contribution of atmospheric pollutants to total

pollution loadings to the Great Lakes, the Chesapeake Bay, Lake Champlain, and coastal waters;

(D) evaluate any adverse effects to public health or the environment caused by such deposition (including effects resulting from indirect exposure pathways) and assess the contribution of such deposition to violations of water quality standards established pursuant to the Federal Water Pollution Control Act [33 USCS §§ 1251 et seq.] and drinking water standards established pursuant to the Safe Drinking Water Act; and

(E) sample for such pollutants in biota, fish, and wildlife of the Great Lakes, the Chesapeake Bay, Lake Champlain and coastal waters and characterize the sources of such pollutants.

(2) Great Lakes monitoring network. The Administrator shall oversee, in accordance with Annex 15 of the Great Lakes Water Quality Agreement, the establishment and operation of a Great Lakes atmospheric deposition network to monitor atmospheric deposition of hazardous air pollutants (and in the Administrator's discretion, other air pollutants) to the Great Lakes.

(A) As part of the network provided for in this paragraph, and not later than December 31, 1991, the Administrator shall establish in each of the 5 Great Lakes at least 1 facility capable of monitoring the atmospheric deposition of hazardous air pollutants in both dry and wet conditions.

(B) The Administrator shall use the data provided by the network to identify and track the movement of hazardous air pollutants through the Great Lakes, to determine the portion of water pollution loadings attributable to atmospheric

deposition of such pollutants, and to support development of remedial action plans and other management plans as required by the Great Lakes Water Quality Agreement.

(C) The Administrator shall assure that the data collected by the Great Lakes atmospheric deposition monitoring network is in a format compatible with databases sponsored by the International Joint Commission, Canada, and the several States of the Great Lakes region.

(3) Monitoring for the Chesapeake Bay and Lake Champlain. The Administrator shall establish at the Chesapeake Bay and Lake Champlain atmospheric deposition stations to monitor deposition of hazardous air pollutants (and in the Administrator's discretion, other air pollutants) within the Chesapeake Bay and Lake Champlain watersheds. The Administrator shall determine the role of air deposition in the pollutant loadings of the Chesapeake Bay and Lake Champlain, investigate the sources of air pollutants deposited in the watersheds, evaluate the health and environmental effects of such pollutant loadings, and shall sample such pollutants in biota, fish and wildlife within the watersheds, as necessary to characterize such effects.

(4) Monitoring for coastal waters. The Administrator shall design and deploy atmospheric deposition monitoring networks for coastal waters and their watersheds and shall make any information collected through such networks available to the public. As part of this effort, the Administrator shall conduct research to develop and improve deposition monitoring methods, and to determine the relative contribution of atmospheric pollutants to pollutant loadings. For purposes of this subsection, "coastal

waters" shall mean estuaries selected pursuant to section 320(a)(2)(A) of the Federal Water Pollution Control Act [33 USCS § 1330(a)(2)(A)] or listed pursuant to section 320(a)(2)(B) of such Act [33 USCS § 1330(a)(2)(B)] or estuarine research reserves designated pursuant to section 315 of the Coastal Zone Management Act (16 U.S.C. 1461).

(5) Report. Within 3 years of the date of enactment of the Clean Air Act Amendments of 1990 and biennially thereafter, the Administrator, in cooperation with the Under Secretary of Commerce for Oceans and Atmosphere, shall submit to the Congress a report on the results of any monitoring, studies, and investigations conducted pursuant to this subsection. Such report shall include, at a minimum, an assessment of—

(A) the contribution of atmospheric deposition to pollution loadings in the Great Lakes, the Chesapeake Bay, Lake Champlain and coastal waters;

(B) the environmental and public health effects of any pollution which is attributable to atmospheric deposition to the Great Lakes, the Chesapeake Bay, Lake Champlain and coastal waters;

(C) the source or sources of any pollution to the Great Lakes, the Chesapeake Bay, Lake Champlain and coastal waters which is attributable to atmospheric deposition;

(D) whether pollution loadings in the Great Lakes, the Chesapeake Bay, Lake Champlain or coastal waters cause or contribute to exceedances of drinking water standards pursuant to the Safe Drinking Water Act or water quality standards pursuant to the Federal Water Pollution Control Act [33 USCS §§ 1251 et seq.] or, with respect to the Great

Lakes, exceedances of the specific objectives of the Great Lakes Water Quality Agreement; and

(E) a description of any revisions of the requirements, standards, and limitations pursuant to this Act and other applicable Federal laws as are necessary to assure protection of human health and the environment.

(6) Additional regulation. As part of the report to Congress, the Administrator shall determine whether the other provisions of this section are adequate to prevent serious adverse effects to public health and serious or widespread environmental effects, including such effects resulting from indirect exposure pathways, associated with atmospheric deposition to the Great Lakes, the Chesapeake Bay, Lake Champlain and coastal waters of hazardous air pollutants (and their atmospheric transformation products). The Administrator shall take into consideration the tendency of such pollutants to bioaccumulate. Within 5 years after the date of enactment of the Clean Air Act Amendments of 1990, the Administrator shall, based on such report and determination, promulgate, in accordance with this section, such further emission standards or control measures as may be necessary and appropriate to prevent such effects, including effects due to bioaccumulation and indirect exposure pathways. Any requirements promulgated pursuant to this paragraph with respect to coastal waters shall only apply to the coastal waters of the States which are subject to section 328(a) [42 USCS § 7628(a)].

(n) Other provisions.

(1) Electric utility steam generating units.

(A) The Administrator shall perform a study of the hazards to public health reasonably anticipated to occur as a result of emissions by electric utility steam generating units of pollutants listed under subsection (b) after imposition of the requirements of this Act. The Administrator shall report the results of this study to the Congress within 3 years after the date of the enactment of the Clean Air Act Amendments of 1990. The Administrator shall develop and de-scribe in the Administrator's report to Congress alternative control strategies for emissions which may warrant regulation under this section. The Administrator shall regulate electric utility steam generating units under this section, if the Administrator finds such regulation is appropriate and necessary after considering the results of the study required by this subparagraph.

(B) The Administrator shall conduct, and transmit to the Congress not later than 4 years after the date of enactment of the Clean Air Act Amendments of 1990, a study of mercury emissions from electric utility steam generating units, municipal waste combustion units, and other sources, including area sources. Such study shall consider the rate and mass of such emissions, the health and environmental effects of such emissions, technologies which are available to control such emissions, and the costs of such technologies.

(C) The National Institute of Environmental Health Sciences shall conduct, and transmit to the Congress not later than 3 years after the date of enactment of the Clean Air Act Amendments of 1990, a study to determine the threshold level of mercury exposure below which adverse human health effects are not expected to occur. Such study shall include a threshold for mercury concentrations in the tissue of

fish which may be consumed (including consumption by sensitive populations) without adverse effects to public health.

(2) Coke oven production technology study.

(A) The Secretary of the Department of Energy and the Administrator shall jointly undertake a 6-year study to assess coke oven production emission control technologies and to assist in the development and commercialization of technically practicable and economically viable control technologies which have the potential to significantly reduce emissions of hazardous air pollutants from coke oven production facilities. In identifying control technologies, the Secretary and the Administrator shall consider the range of existing coke oven operations and battery design and the availability of sources of materials for such coke ovens as well as alternatives to existing coke oven production design.

(B) The Secretary and the Administrator are authorized to enter into agreements with persons who propose to develop, install and operate coke production emission control technologies which have the potential for significant emissions reductions of hazardous air pollutants provided that Federal funds shall not exceed 50 per centum of the cost of any project assisted pursuant to this paragraph.

(C) On completion of the study, the Secretary shall submit to Congress a report on the results of the study and shall make recommendations to the Administrator identifying practicable and economically viable control technologies for coke oven production facilities to reduce residual risks remaining after implementation of the standard under sub-section (d).

(D) There are authorized to be appropriated $5,000,000 for each of the fiscal years 1992 through 1997 to carry out the program authorized by this paragraph.

(3) Publicly owned treatment works. The Administrator may conduct, in cooperation with the owners and operators of publicly owned treatment works, studies to characterize emissions of hazardous air pollutants emitted by such facilities, to identify industrial, commercial and residential discharges that contribute to such emissions and to demonstrate control measures for such emissions. When promulgating any standard under this section applicable to publicly owned treatment works, the Administrator may provide for control measures that include pretreatment of discharges causing emissions of hazardous air pollutants and process or product substitutions or limitations that may be effective in reducing such emissions. The Administrator may prescribe uniform sampling, modeling and risk assessment methods for use in implementing this subsection.

(4) Oil and gas wells; pipeline facilities.

(A) Notwithstanding the provisions of subsection (a), emissions from any oil or gas exploration or production well (with its associated equipment) and emissions from any pipeline compressor or pump station shall not be aggregated with emissions from other similar units, whether or not such units are in a contiguous area or under common control, to determine whether such units or stations are major sources, and in the case of any oil or gas exploration or production well (with its associated equipment), such emissions shall not be aggregated for any purpose under this section.

(B) The Administrator shall not list oil and gas production wells (with its associated equipment) as an area source category under subsection (c), except that the Administrator may establish an area source category for oil and gas production wells located in any metropolitan statistical area or consolidated metropolitan statistical area with a population in excess of 1 million, if the Administrator determines that emissions of hazardous air pollutants from such wells present more than a negligible risk of adverse effects to public health.

(5) Hydrogen sulfide. The Administrator is directed to assess the hazards to public health and the environment resulting from the emission of hydrogen sulfide associated with the extraction of oil and natural gas resources. To the extent practicable, the assessment shall build upon and not duplicate work conducted for an assessment pursuant to section 8002(m) of the Solid Waste Disposal Act [42 USCS § 6982(m)] and shall reflect consultation with the States. The assessment shall include a review of existing State and industry control standards, techniques and enforcement. The Administrator shall report to the Congress within 24 months after the date of enactment of the Clean Air Act Amendments of 1990 with the findings of such assessment, together with any recommendations, and shall, as appropriate, develop and implement a control strategy for emissions of hydrogen sulfide to protect human health and the environment, based on the findings of such assessment, using authorities under this Act including sections [section] 111 [42 USCS § 7411] and this section.

(6) Hydrofluoric acid. Not later than 2 years after the date of enactment of the Clean Air Act

Amendments of 1990, the Administrator shall, for those regions of the country which do not have comprehensive health and safety regulations with respect to hydrofluoric acid, complete a study of the potential hazards of hydrofluoric acid and the uses of hydrofluoric acid in industrial and commercial applications to public health and the environment considering a range of events including worst-case accidental releases and shall make recommendations to the Congress for the reduction of such hazards, if appropriate.

(7) RCRA facilities. In the case of any category or subcategory of sources the air emissions of which are regulated under subtitle C of the Solid Waste Disposal Act [42 USCS §§ 6921 et seq.], the Administrator shall take into account any regulations of such emissions which are promulgated under such subtitle and shall, to the maximum extent practicable and consistent with the provisions of this section, ensure that the requirements of such subtitle and this section are consistent.

(o) National Academy of Sciences study.

(1) Request of the Academy. Within 3 months of the date of enactment of the Clean Air Act Amendments of 1990, the Administrator shall enter into appropriate arrangements with the National Academy of Sciences to conduct a review of—

(A) risk assessment methodology used by the Environmental Protection Agency to determine the carcinogenic risk associated with exposure to hazardous air pollutants from source categories and subcategories subject to the requirements of this section; and

(B) improvements in such methodology.

(2) Elements to be studied. In conducting such review, the National Academy of Sciences should consider, but not be limited to, the following—

(A) the techniques used for estimating and describing the carcinogenic potency to humans of hazardous air pollutants; and

(B) the techniques used for estimating exposure to hazardous air pollutants (for hypothetical and actual max-imally exposed individuals as well as other exposed individuals).

(3) Other health effects of concern. To the extent practicable, the Academy shall evaluate and report on the methodology for assessing the risk of adverse human health effects other than cancer for which safe thresholds of exposure may not exist, including, but not limited to, inheritable genetic mutations, birth defects, and reproductive dysfunctions.

(4) Report. A report on the results of such review shall be submitted to the Senate Committee on Environment and Public Works, the House Committee on Energy and Commerce, the Risk Assessment and Management Commission established by section 303 of the Clean Air Act Amendments of 1990 [note to this section] and the Administrator not later than 30 months after the date of enactment of the Clean Air Act Amendments of 1990.

(5) Assistance. The Administrator shall assist the Academy in gathering any information the Academy deems necessary to carry out this subsection. The Administrator may use any authority under this Act to obtain information from any person, and to require any person to conduct tests, keep and produce records,

and make reports respecting research or other activities conducted by such person as necessary to carry out this subsection.

(6) Authorization. Of the funds authorized to be appropriated to the Administrator by this Act, such amounts as are required shall be available to carry out this subsection.

(7) Guidelines for carcinogenic risk assessment. The Administrator shall consider, but need not adopt, the recommendations contained in the report of the National Academy of Sciences prepared pursuant to this subsection and the views of the Science Advisory Board, with respect to such report. Prior to the promulgation of any standard under sub-section (f), and after notice and opportunity for comment, the Administrator shall publish revised Guidelines for Carcinogenic Risk Assessment or a detailed explanation of the reasons that any recommendations contained in the report of the National Academy of Sciences will not be implemented. The publication of such revised Guidelines shall be a final Agency action for purposes of section 307 [42 USCS § 7607].

(p) Mickey Leland Urban Air Toxics Research Center.

(1) Establishment. The Administrator shall oversee the establishment of a National Urban Air Toxics Research Center, to be located at a university, a hospital, or other facility capable of undertaking and maintaining similar re-search capabilities in the areas of epidemiology, oncology, toxicology, pulmonary medicine, pathology, and biostatistics. The center shall be known as the Mickey Leland National Urban Air Toxics Research Center. The geographic site of the National Urban Air Toxics Research Center should be further directed to Harris County, Texas, in order to

take full advantage of the well developed scientific community presence on-site at the Texas Medical Center as well as the extensive data previously compiled for the comprehensive monitoring system currently in place.

(2) Board of Directors. The National Urban Air Toxics Research Center shall be governed by a Board of Directors to be comprised of 9 members, the appointment of which shall be allocated pro rata among the Speaker of the House, the Majority Leader of the Senate and the President. The members of the Board of Directors shall be selected based on their respective academic and professional backgrounds and expertise in matters relating to public health, environ-mental pollution and industrial hygiene. The duties of the Board of Directors shall be to determine policy and research guidelines, submit views from center sponsors and the public and issue periodic reports of center findings and activities.

(3) Scientific Advisory Panel. The Board of Directors shall be advised by a Scientific Advisory Panel, the 13 members of which shall be appointed by the Board, and to include eminent members of the scientific and medical communities. The Panel membership may include scientists with relevant experience from the National Institute of Environmental Health Sciences, the Center for Disease Control, the Environmental Protection Agency, the National Cancer Institute, and others, and the Panel shall conduct peer review and evaluate research results. The Panel shall assist the Board in developing the research agenda, reviewing proposals and applications, and advise on the awarding of research grants.

(4) Funding. The center shall be established and funded with both Federal and private source funds.

(q) Savings provision.

(1) Standards previously promulgated. Any standard under this section in effect before the date of enactment of the Clean Air Act Amendments of 1990 shall remain in force and effect after such date unless modified as provided in this section before the date of enactment of such Amendments or under such Amendments. Except as provided in paragraph (4), any standard under this section which has been promulgated, but has not taken effect, before such date shall not be affected by such Amendments unless modified as provided in this section before such date or under such Amendments. Each such standard shall be reviewed and, if appropriate, revised, to comply with the requirements of subsection (d) within 10 years after the date of enactment of the Clean Air Act Amendments of 1990. If a timely petition for review of any such standard under section 307 [42 USCS § 7607] is pending on such date of enactment, the standard shall be upheld if it complies with this section as in effect before that date. If any such standard is remanded to the Administrator, the Administrator may in the Administrator's discretion apply either the requirements of this section, or those of this section as in effect before the date of enactment of the Clean Air Act Amendments of 1990.

(2) Special rule. Notwithstanding paragraph (1), no standard shall be established under this section, as amended by the Clean Air Act Amendments of 1990, for radionuclide emissions from (A) elemental phosphorous plants, (B) grate calcination elemental phosphorous plants, (C) phosphogypsum stacks, or (D) any subcategory of the foregoing. This section, as in

effect prior to the date of enactment of the Clean Air Act Amendments of 1990, shall remain in effect for radionuclide emissions from such plants and stacks.

(3) Other categories. Notwithstanding paragraph (1), this section, as in effect prior to the date of enactment of the Clean Air Act Amendments of 1990, shall remain in effect for radionuclide emissions from non-Department of Energy Federal facilities that are not licensed by the Nuclear Regulatory Commission, coal-fired utility and industrial boilers, underground uranium mines, surface uranium mines, and disposal of uranium mill tailings piles, unless the Administrator, in the Administrator's discretion, applies the requirements of this section as modified by the Clean Air Act Amendents of 1990 to such sources of radionuclides.

(4) Medical facilities. Notwithstanding paragraph (1), no standard promulgated under this section prior to the date of enactment of the Clean Air Act Amendments of 1990 with respect to medical research or treatment facilities shall take effect for two years following the date of enactment of the Clean Air Act Amendments of 1990, unless the Administrator makes a determination pursuant to a rulemaking under section 112(d)(9) [42 USCS § 7412(d)(9)]. If the Administrator determines that the regulatory program established by the Nuclear Regulatory Commission for such facilities does not provide an ample margin of safety to protect public health, the requirements of section 112 [42 USCS § 7412] shall fully apply to such facilities. If the Administrator determines that such regulatory program does provide an ample margin of safety to protect the public health, the Administrator is not required to promulgate a

standard under this section for such facilities, as provided in section 112(d)(9) [42 USCS § 7412(d)(9)].

(r) Prevention of accidental releases.

(1) Purpose and general duty. It shall be the objective of the regulations and programs authorized under this subsection to prevent the accidental release and to minimize the consequences of any such release of any substance listed pursuant to paragraph (3) or any other extremely hazardous substance. The owners and operators of stationary sources producing, processing, handling or storing such substances have a general duty in the same manner and to the same extent as section 654, title 29 of the United States Code, to identify hazards which may result from such releases using appropriate hazard assessment techniques, to design and maintain a safe facility taking such steps as are necessary to prevent releases, and to minimize the consequences of accidental releases which do occur. For purposes of this paragraph, the provisions of section 304 [42 USCS § 7604] shall not be available to any person or otherwise be construed to be applicable to this paragraph. Nothing in this section shall be interpreted, construed, implied or applied to create any liability or basis for suit for compensation for bodily injury or any other injury or property damages to any person which may result from accidental releases of such substances.

(2) Definitions.

(A) The term "accidental release" means an unanticipated emission of a regulated substance or other extremely hazardous substance into the ambient air from a stationary source.

(B) The term "regulated substance" means a substance listed under paragraph (3).

(C) The term "stationary source" means any buildings, structures, equipment, installations or substance emitting stationary activities (i) which belong to the same industrial group, (ii) which are located on one or more contiguous properties, (iii) which are under the control of the same person (or persons under common control), and (iv) from which an accidental release may occur.

(D) The term "retail facility" means a stationary source at which more than one-half of the income is obtained from direct sales to end users or at which more than one-half of the fuel sold, by volume, is sold through a cylinder ex-change program.

(3) List of substances. The Administrator shall promulgate not later than 24 months after enactment of the Clean Air Act Amendments of 1990 an initial list of 100 substances which, in the case of an accidental release, are known to cause or may reasonably be anticipated to cause death, injury, or serious adverse effects to human health or the environment. For purposes of promulgating such list, the Administrator shall use, but is not limited to, the list of extremely hazardous substances published under the Emergency Planning and Community Right-to-Know [Right-To-Know] Act of 1986 [42 USCS §§ 11001 et seq.], with such modifications as the Administrator deems appropriate. The initial list shall include chlorine, anhydrous ammonia, methyl chloride, ethylene oxide, vinyl chloride, methyl isocyanate, hydro-gen cyanide, ammonia, hydrogen sulfide, toluene diisocyanate, phosgene, bromine, anhydrous hydrogen chloride, hydrogen fluoride, anhydrous sulfur dioxide, and sulfur trioxide. The initial list shall include at least

100 substances which pose the greatest risk of causing death, injury, or serious adverse effects to human health or the environment from accidental releases. Regulations establishing the list shall include an explanation of the basis for establishing the list. The list may be revised from time to time by the Administrator on the Administrator's own motion or by petition and shall be reviewed at least every 5 years. No air pollutant for which a national primary ambient air quality standard has been established shall be included on any such list. No substance, practice, process, or activity regulated under title VI [42 USCS §§ 7671 et seq.] shall be subject to regulations under this subsection. The Administrator shall establish procedures for the addition and deletion of substances from the list established under this paragraph consistent with those applicable to the list in subsection (b).

(4) Factors to be considered. In listing substances under paragraph (3), the Administrator—

(A) shall consider—

(i) the severity of any acute adverse health effects associated with accidental releases of the substance;

(ii) the likelihood of accidental releases of the substance; and

(iii) the potential magnitude of human exposure to accidental releases of the substance; and

(B) shall not list a flammable substance when used as a fuel or held for sale as a fuel at a retail facility under this subsection solely because of the explosive or flammable properties of the substance, unless a fire or explosion caused by the substance will

result in acute adverse health effects from human exposure to the substance, including the unburned fuel or its combustion byproducts, other than those caused by the heat of the fire or impact of the explosion.

(5) Threshold quantity. At the time any substance is listed pursuant to paragraph (3), the Administrator shall establish by rule, a threshold quantity for the substance, taking into account the toxicity, reactivity, volatility, dispersibility, combustibility, or flammability of the substance and the amount of the substance which, as a result of an accidental release, is known to cause or may reasonably be anticipated to cause death, injury or serious adverse effects to human health for which the substance was listed. The Administrator is authorized to establish a greater threshold quantity for, or to exempt entirely, any substance that is a nutrient used in agriculture when held by a farmer.

(6) Chemical Safety Board.

(A) There is hereby established an independent safety board to be known as the Chemical Safety and Hazard Investigation Board.

(B) The Board shall consist of 5 members, including a Chairperson, who shall be appointed by the President, by and with the advice and consent of the Senate. Members of the Board shall be appointed on the basis of technical qualification, professional standing, and demonstrated knowledge in the fields of accident reconstruction, safety engineering, human factors, toxicology, or air pollution regulation. The terms of office of members of the Board shall be 5 years. Any member of the Board, including the Chairperson, may be removed for inefficiency, neglect

of duty, or malfeasance in office. The Chairperson shall be the Chief Executive Officer of the Board and shall exercise the executive and administrative functions of the Board.

(C) The Board shall—

(i) investigate (or cause to be investigated), determine and report to the public in writing the facts, conditions, and circumstances and the cause or probable cause of any accidental release resulting in a fatality, serious injury or substantial property damages;

(ii) issue periodic reports to the Congress, Federal, State and local agencies, including the Environmental Protection Agency and the Occupational Safety and Health Administration, concerned with the safety of chemical production, processing, handling and storage, and other interested persons recommending measures to reduce the likelihood or the consequences of accidental releases and proposing corrective steps to make chemical production, processing, handling and storage as safe and free from risk of injury as is possible and may include in such reports pro-posed rules or orders which should be issued by the Administrator under the authority of this section or the Secretary of Labor under the Occupational Safety and Health Act to prevent or minimize the consequences of any release of sub-stances that may cause death, injury or other serious adverse effects on human health or substantial property damage as the result of an accidental release; and

(iii) establish by regulation requirements binding on persons for reporting accidental releases into the ambient air subject to the Board's

investigatory jurisdiction. Reporting releases to the National Response Center, in lieu of the Board directly, shall satisfy such regulations. The National Response Center shall promptly notify the Board of any releases which are within the Board's jurisdiction.

(D) The Board may utilize the expertise and experience of other agencies.

(E) The Board shall coordinate its activities with investigations and studies conducted by other agencies of the United States having a responsibility to protect public health and safety. The Board shall enter into a memorandum of understanding with the National Transportation Safety Board to assure coordination of functions and to limit duplication of activities which shall designate the National Transportation Safety Board as the lead agency for the investigation of releases which are transportation related. The Board shall not be authorized to investigate marine oil spills, which the National Transportation Safety Board is authorized to investigate. The Board shall enter into a memorandum of understanding with the Occupational Safety and Health Administration so as to limit duplication of activities. In no event shall the Board forego an investigation where an accidental release causes a fatality or serious injury among the general public, or had the potential to cause substantial property damage or a number of deaths or injuries among the general public.

(F) The Board is authorized to conduct research and studies with respect to the potential for accidental releases, whether or not an accidental release has occurred, where there is evidence which indicates the presence of a potential hazard or hazards. To the extent practicable, the Board shall conduct such

studies in cooperation with other Federal agencies having emergency response authorities, State and local governmental agencies and associations and organizations from the industrial, commercial, and non-profit sectors.

(G) No part of the conclusions, findings, or recommendations of the Board relating to any accidental release or the investigation thereof shall be admitted as evidence or used in any action or suit for damages arising out of any matter mentioned in such report.

(H) Not later than 18 months after the date of enactment of the Clean Air Act Amendments of 1990, the Board shall publish a report accompanied by recommendations to the Administrator on the use of hazard assessments in preventing the occurrence and minimizing the consequences of accidental releases of extremely hazardous substances. The recommendations shall include a list of extremely hazardous substances which are not regulated substances (including threshold quantities for such substances) and categories of stationary sources for which hazard assessments would be an appropriate measure to aid in the prevention of accidental releases and to minimize the consequences of those releases that do occur. The recommendations shall also include a description of the information and analysis which would be appropriate to include in any hazard assessment. The Board shall also make recommendations with respect to the role of risk management plans as required by paragraph (8)(B) [(7)(B)] in preventing accidental releases. The Board may from time to time review and revise its recommendations under this subparagraph.

(I) Whenever the Board submits a recommendation with respect to accidental releases to the Administrator, the Administrator shall respond to such recommendation formally and in writing not later than 180 days after receipt thereof. The response to the Board's recommendation by the Administrator shall indicate whether the Administrator will—

(i) initiate a rulemaking or issue such orders as are necessary to implement the recommendation in full or in part, pursuant to any timetable contained in the recommendation; [or]

(ii) decline to initiate a rulemaking or issue orders as recommended.

Any determination by the Administrator not to implement a recommendation of the Board or to implement a recommendation only in part, including any variation from the schedule contained in the recommendation, shall be accompanied by a statement from the Administrator setting forth the reasons for such determination.

(J) The Board may make recommendations with respect to accidental releases to the Secretary of Labor. Whenever the Board submits such recommendation, the Secretary shall respond to such recommendation formally and in writing not later than 180 days after receipt thereof. The response to the Board's recommendation by the Administrator [Secretary] shall indicate whether the Secretary will—

(i) initiate a rulemaking or issue such orders as are necessary to implement the recommendation in full or in part, pursuant to any timetable contained in the recommendation;

(ii) decline to initiate a rulemaking or issue orders as recommended.

Any determination by the Secretary not to implement a recommendation or to implement a recommendation only in part, including any variation from the schedule contained in the recommendation, shall be accompanied by a statement from the Secretary setting forth the reasons for such determination.

(K) Within 2 years after enactment of the Clean Air Act Amendments of 1990, the Board shall issue a report to the Administrator of the Environmental Protection Agency and to the Administrator of the Occupational Safety and Health Administration recommending the adoption of regulations for the preparation of risk management plans and general requirements for the prevention of accidental releases of regulated substances into the ambient air (including recommendations for listing substances under paragraph (3)) and for the mitigation of the potential adverse effect on human health or the environment as a result of accidental releases which should be applicable to any stationary source handling any regulated substance in more than threshold amounts. The Board may include proposed rules or orders which should be issued by the Administrator under authority of this subsection or by the Secretary of Labor under the Occupational Safety and Health Act. Any such recommendations shall be specific and shall identify the regulated sub-stance or class of regulated substances (or other substances) to which the recommendations apply. The Administrator shall consider such recommendations before promulgating regulations required by paragraph (7)(B).

(L) The Board, or upon authority of the Board, any member thereof, any administrative law judge employed by or assigned to the Board, or any officer or employee duly designated by the Board, may for the purpose of carrying out duties authorized by subparagraph (C)—

(i) hold such hearings, sit and act at such times and places, administer such oaths, and require by subpoena or otherwise attendance and testimony of such witnesses and the production of evidence and may require by order that any person engaged in the production, processing, handling, or storage of extremely hazardous substances submit writ-ten reports and responses to requests and questions within such time and in such form as the Board may require; and

(ii) upon presenting appropriate credentials and a written notice of inspection authority, enter any property where an accidental release causing a fatality, serious injury or substantial property damage has occurred and do all things therein necessary for a proper investigation pursuant to subparagraph (C) and inspect at reasonable times records, files, papers, processes, controls, and facilities and take such samples as are relevant to such investigation.

Whenever the Administrator or the Board conducts an inspection of a facility pursuant to this subsection, employees and their representatives shall have the same rights to participate in such inspections as provided in the Occupational Safety and Health Act.

(M) In addition to that described in subparagraph (L), the Board may use any information gathering authority of the Administrator under this

Act, including the subpoena power provided in section 307(a)(1) of this Act [42 USCS § 7607(a)(1)].

(N) The Board is authorized to establish such procedural and administrative rules as are necessary to the exercise of its functions and duties. The Board is authorized without regard to section 5 of title 41 of the United States Code [41 USCS § 6101] to enter into contracts, leases, cooperative agreements or other transactions as may be necessary in the conduct of the duties and functions of the Board with any other agency, institution, or person.

(O) After the effective date of any reporting requirement promulgated pursuant to subparagraph (C)(iii) it shall be unlawful for any person to fail to report any release of any extremely hazardous substance as required by such subparagraph. The Administrator is authorized to enforce any regulation or requirements established by the Board pursuant to subparagraph (C)(iii) using the authorities of sections 113 and 114 [42 USCS §§ 7413, 7414]. Any request for information from the owner or operator of a stationary source made by the Board or by the Administrator under this section shall be treated, for purposes of sections 113, 114, 116, 120, 303, 304 and 307 [42 USCS §§ 7413, 7414, 7416, 7420, 7603, 7604, and 7607] and any other enforcement provisions of this Act, as a request made by the Administrator under section 114 [42 USCS § 7414] and may be enforced by the Chairperson of the Board or by the Administrator as provided in such section.

(P) The Administrator shall provide to the Board such support and facilities as may be necessary for operation of the Board.

(Q) Consistent with subsection [subparagraph] (G) and section 114(c) [42 USCS § 7414(c)] any records, reports or information obtained by the Board shall be available to the Administrator, the Secretary of Labor, the Congress and the public, except that upon a showing satisfactory to the Board by any person that records, reports, or information, or particular part thereof (other than release or emissions data) to which the Board has access, if made public, is likely to cause substantial harm to the person's competitive position, the Board shall consider such record, report, or information or particular portion thereof confidential in accordance with section 1905 of title 18 of the United States Code, except that such record, report, or information may be disclosed to other officers, employees, and authorized representatives of the United States concerned with carrying out this Act or when relevant under any proceeding under this Act. This subparagraph does not constitute authority to withhold records, reports, or information from the Congress.

(R) Whenever the Board submits or transmits any budget estimate, budget request, supplemental budget re-quest, or other budget information, legislative recommendation, prepared testimony for congressional hearings, recommendation or study to the President, the Secretary of Labor, the Administrator, or the Director of the Office of Management and Budget, it shall concurrently transmit a copy thereof to the Congress. No report of the Board shall be subject to review by the Administrator or any Federal agency or to judicial review in any court. No officer or agency of the United States shall have authority to require the Board to submit its budget requests or estimates, legislative recommendations, prepared testimony, comments,

recommendations or reports to any officer or agency of the United States for approval or review prior to the submission of such recommendations, testimony, comments or reports to the Congress. In the performance of their functions as established by this Act, the members, officers and employees of the Board shall not be responsible to or subject to supervision or direction, in carrying out any duties under this subsection, of any officer or employee or agent of the Environmental Protection Agency, the Department of Labor or any other agency of the United States except that the President may remove any member, officer or employee of the Board for inefficiency, neglect of duty or malfeasance in office. Nothing in this section shall affect the application of title 5, United States Code to officers or employees of the Board.

(S) The Board shall submit an annual report to the President and to the Congress which shall include, but not be limited to, information on accidental releases which have been investigated by or reported to the Board during the previous year, recommendations for legislative or administrative action which the Board has made, the actions which have been taken by the Administrator or the Secretary of Labor or the heads of other agencies to implement such recommendations, an identification of priorities for study and investigation in the succeeding year, progress in the development of risk-reduction technologies and the response to and implementation of significant research findings on chemical safety in the public and private sector.

(7) Accident prevention.

(A) In order to prevent accidental releases of regulated substances, the Administrator is authorized to promulgate release prevention, detection, and

correction requirements which may include monitoring, record-keeping, reporting, training, vapor recovery, secondary containment, and other design, equipment, work practice, and operational requirements. Regulations promulgated under this paragraph may make distinctions between various types, classes, and kinds of facilities, devices and systems taking into consideration factors including, but not limited to, the size, location, process, process controls, quantity of substances handled, potency of substances, and response capabilities present at any stationary source. Regulations promulgated pursuant to this subparagraph shall have an effective date, as deter-mined by the Administrator, assuring compliance as expeditiously as practicable.

(B) (i) Within 3 years after the date of enactment of the Clean Air Act Amendments of 1990, the Administrator shall promulgate reasonable regulations and appropriate guidance to provide, to the greatest extent practicable, for the prevention and detection of accidental releases of regulated substances and for response to such releases by the owners or operators of the sources of such releases. The Administrator shall utilize the expertise of the Secretaries of Transportation and Labor in promulgating such regulations. As appropriate, such regulations shall cover the use, operation, re-pair, replacement, and maintenance of equipment to monitor, detect, inspect, and control such releases, including training of persons in the use and maintenance of such equipment and in the conduct of periodic inspections. The regulations shall include procedures and measures for emergency response after an accidental release of a regulated sub-stance in order to protect human health and the environment. The regulations shall cover storage, as well as

operations. The regulations shall, as appropriate, recognize differences in size, operations, processes, class and categories of sources and the voluntary actions of such sources to prevent such releases and respond to such releases. The regulations shall be applicable to a stationary source 3 years after the date of promulgation, or 3 years after the date on which a regulated substance present at the source in more than threshold amounts is first listed under paragraph (3), whichever is later.

(ii) The regulations under this subparagraph shall require the owner or operator of stationary sources at which a regulated substance is present in more than a threshold quantity to prepare and implement a risk management plan to detect and prevent or minimize accidental releases of such substances from the stationary source, and to pro-vide a prompt emergency response to any such releases in order to protect human health and the environment. Such plan shall provide for compliance with the requirements of this subsection and shall also include each of the following:

(I) a hazard assessment to assess the potential effects of an accidental release of any regulated sub-stance. This assessment shall include an estimate of potential release quantities and a determination of downwind effects, including potential exposures to affected populations. Such assessment shall include a previous release history of the past 5 years, including the size, concentration, and duration of releases, and shall include an evaluation of worst case accidental releases;

(II) a program for preventing accidental releases of regulated substances, including safety precautions and maintenance, monitoring and

employee training measures to be used at the source; and

(III) a response program providing for specific actions to be taken in response to an accidental release of a regulated substance so as to protect human health and the environment, including procedures for informing the public and local agencies responsible for responding to accidental releases, emergency health care, and employee training measures.

At the time regulations are promulgated under this subparagraph, the Administrator shall promulgate guide-lines to assist stationary sources in the preparation of risk management plans. The guidelines shall, to the extent practicable, include model risk management plans.

(iii) The owner or operator of each stationary source covered by clause (ii) shall register a risk management plan prepared under this subparagraph with the Administrator before the effective date of regulations under clause (i) in such form and manner as the Administrator shall, by rule, require. Plans prepared pursuant to this subparagraph shall also be submitted to the Chemical Safety and Hazard Investigation Board, to the State in which the stationary source is located, and to any local agency or entity having responsibility for planning for or responding to accidental releases which may occur at such source, and shall be available to the public under section 114(c) [42 USCS § 7414(c)]. The Administrator shall establish, by rule, an auditing system to regularly review and, if necessary, require revision in risk management plans to assure that the plans comply with this subparagraph. Each such plan shall

be updated periodically as required by the Administrator, by rule.

(C) Any regulations promulgated pursuant to this subsection shall to the maximum extent practicable, consistent with this subsection, be consistent with the recommendations and standards established by the American Society of Mechanical Engineers (ASME), the American National Standards Institute (ANSI) or the American Society of Testing Materials (ASTM). The Administrator shall take into consideration the concerns of small business in promulgating regulations under this subsection.

(D) In carrying out the authority of this paragraph, the Administrator shall consult with the Secretary of Labor and the Secretary of Transportation and shall coordinate any requirements under this paragraph with any requirements established for comparable purposes by the Occupational Safety and Health Administration or the Department of Transportation. Nothing in this subsection shall be interpreted, construed or applied to impose requirements affecting, or to grant the Administrator, the Chemical Safety and Hazard Investigation Board, or any other agency any authority to regulate (including requirements for hazard assessment), the accidental release of radionuclides arising from the construction and operation of facilities licensed by the Nuclear Regulatory Commission.

(E) After the effective date of any regulation or requirement imposed under this subsection, it shall be unlawful for any person to operate any stationary source subject to such regulation or requirement in violation of such regulation or requirement. Each regulation or requirement under this subsection shall

for purposes of sections 113, 114, 116, 120, 304, and 307 [42 USCS §§ 7413, 7414, 7416, 7420, 7604, and 7607] and other enforcement provisions of this Act, be treated as a standard in effect under subsection (d).

(F) Notwithstanding the provisions of title V [42 USCS §§ 7661 et seq.] or this section, no stationary source shall be required to apply for, or operate pursuant to, a permit issued under such title solely because such source is subject to regulations or requirements under this subsection.

(G) In exercising any authority under this subsection, the Administrator shall not, for purposes of section 653(b)(1) of title 29 of the United States Code, be deemed to be exercising statutory authority to prescribe or enforce standards or regulations affecting occupational safety and health.

(H) Public access to off-site consequence analysis information.

(i) Definitions. In this subparagraph:

(I) Covered person. The term "covered person" means—

(aa) an officer or employee of the United States;

(bb) an officer or employee of an agent or contractor of the Federal Government;

(cc) an officer or employee of a State or local government;

(dd) an officer or employee of an agent or contractor of a State or local government;

(ee) an individual affiliated with an entity that has been given, by a State or local

government, re-sponsibility for preventing, planning for, or responding to accidental releases;

(ff) an officer or employee or an agent or contractor of an entity described in item (ee); and

(gg) a qualified researcher under clause (vii).

(II) Official use. The term "official use" means an action of a Federal, State, or local government agency or an entity referred to in subclause (I)(ee) intended to carry out a function relevant to preventing, planning for, or responding to accidental releases.

(III) Off-site consequence analysis information. The term "off-site consequence analysis information" means those portions of a risk management plan, excluding the executive summary of the plan, consisting of an evaluation of 1 or more worst-case release scenarios or alternative release scenarios, and any electronic data base created by the Administrator from those portions.

(IV) Risk management plan. The term "risk management plan" means a risk management plan sub-mitted to the Administrator by an owner or operator of a stationary source under subparagraph (B)(iii).

(ii) Regulations. Not later than 1 year after the date of enactment of this subparagraph [enacted Aug. 5, 1999], the President shall—

(I) assess—

(aa) the increased risk of terrorist and other criminal activity associated with the posting of off-site consequence analysis information on the Internet; and

(bb) the incentives created by public disclosure of off-site consequence analysis information for reduction in the risk of accidental releases; and

(II) based on the assessment under subclause (I), promulgate regulations governing the distribution of off-site consequence analysis information in a manner that, in the opinion of the President, minimizes the likelihood of accidental releases and the risk described in subclause (I)(aa) and the likelihood of harm to public health and welfare, and—

(aa) allows access by any member of the public to paper copies of off-site consequence analysis information for a limited number of stationary sources located anywhere in the United States, without any geographical restriction;

(bb) allows other public access to off-site consequence analysis information as appropriate;

(cc) allows access for official use by a covered person described in any of items (cc) through (ff) of clause (i)(I) (referred to in this subclause as a "State or local covered person") to off-site consequence analysis information relating to stationary sources located in the person's State;

(dd) allows a State or local covered person to provide, for official use, off-site consequence analysis information relating to stationary sources located in the person's State to a State or local covered person in a contiguous State; and

(ee) allows a State or local covered person to obtain for official use, by request to the

Administrator, off-site consequence analysis information that is not available to the person under item (cc).

(iii) Availability under Freedom of Information Act.

(I) First year. Off-site consequence analysis information, and any ranking of stationary sources derived from the information, shall not be made available under section 552 of title 5, United States Code, during the 1-year period beginning on the date of enactment of this subparagraph [enacted Aug. 5, 1999].

(II) After first year. If the regulations under clause (ii) are promulgated on or before the end of the period described in subclause (I), off-site consequence analysis information covered by the regulations, and any ranking of stationary sources derived from the information, shall not be made available under section 552 of title 5, United States Code, after the end of that period.

(III) Applicability. Subclauses (I) and (II) apply to off-site consequence analysis information submitted to the Administrator before, on, or after the date of enactment of this subparagraph [enacted Aug. 5, 1999].

(iv) Availability of information during transition period. The Administrator shall make off-site consequence analysis information available to covered persons for official use in a manner that meets the requirements of items (cc) through (ee) of clause (ii)(II), and to the public in a form that does not make available any information concerning the identity or location of stationary sources, during the period—

(I) beginning on the date of enactment of this subparagraph [enacted Aug. 5, 1999]; and

(II) ending on the earlier of the date of promulgation of the regulations under clause (ii) or the date that is 1 year after the date of enactment of this subparagraph [enacted Aug. 5, 1999].

(v) Prohibition on unauthorized disclosure of information by covered persons.

(I) In general. Beginning on the date of enactment of this subparagraph [enacted Aug. 5, 1999], a covered person shall not disclose to the public off-site consequence analysis information in any form, or any statewide or national ranking of identified stationary sources derived from such information, except as authorized by this subparagraph (including the regulations promulgated under clause (ii)). After the end of the 1-year period beginning on the date of enactment of this subparagraph [enacted Aug. 5, 1999], if regulations have not been promulgated under clause (ii), the preceding sentence shall not apply.

(II) Criminal penalties. Notwithstanding section 113 [42 USCS § 7413], a covered person that willfully violates a restriction or prohibition established by this subparagraph (including the regulations promulgated under clause (ii)) shall, upon conviction, be fined for an infraction under section 3571 of title 18, United States Code, (but shall not be subject to imprisonment) for each unauthorized disclosure of off-site consequence analysis information, except that subsection (d) of such section 3571 shall not apply to a case in which the offense results in pecuniary loss unless the defendant knew that such loss would occur. The disclosure of off-site consequence analysis information for each specific stationary

source shall be considered a separate offense. The total of all penalties that may be imposed on a single person or organization under this item shall not exceed $1,000,000 for violations committed during any 1 calendar year.

(III) Applicability. If the owner or operator of a stationary source makes off-site consequence analysis information relating to that stationary source available to the public without restriction—

(aa) subclauses (I) and (II) shall not apply with respect to the information; and

(bb) the owner or operator shall notify the Administrator of the public availability of the infor-mation.

(IV) List. The Administrator shall maintain and make publicly available a list of all stationary sources that have provided notification under subclause (III)(bb).

(vi) Notice. The Administrator shall provide notice of the definition of official use as provided in clause (i)(III) [(i)(II)] and examples of actions that would and would not meet that definition, and notice of the restrictions on further dissemination and the penalties established by this Act to each covered person who receives off-site consequence analysis information under clause (iv) and each covered person who receives off-site consequence analysis information for an official use under the regulations promulgated under clause (ii).

(vii) Qualified researchers.

(I) In general. Not later than 180 days after the date of enactment of this subparagraph [enacted Aug. 5, 1999], the Administrator, in

consultation with the Attorney General, shall develop and implement a system for providing off-site consequence analysis information, including facility identification, to any qualified researcher, including a qualified researcher from industry or any public interest group.

(II) Limitation on dissemination. The system shall not allow the researcher to disseminate, or make available on the Internet, the off-site consequence analysis information, or any portion of the off-site consequence analysis information, received under this clause.

(viii) Read-only information technology system. In consultation with the Attorney General and the heads of other appropriate Federal agencies, the Administrator shall establish an information technology system that provides for the availability to the public of off-site consequence analysis information by means of a central data base under the control of the Federal Government that contains information that users may read, but that provides no means by which an electronic or mechanical copy of the information may be made.

(ix) Voluntary industry accident prevention standards. The Environmental Protection Agency, the Department of Justice, and other appropriate agencies may provide technical assistance to owners and operators of stationary sources and participate in the development of voluntary industry standards that will help achieve the objectives set forth in paragraph (1).

(x) Effect on State or local law.

(I) In general. Subject to subclause (II), this subparagraph (including the regulations promulgated under this subparagraph) shall supersede any

provision of State or local law that is inconsistent with this subparagraph (including the regulations).

(II) Availability of information under State law. Nothing in this subparagraph precludes a State from making available data on the off-site consequences of chemical releases collected in accordance with State law.

(xi) Report.

(I) In general. Not later than 3 years after the date of enactment of this subparagraph [enacted Aug. 5, 1999], the Attorney General, in consultation with appropriate State, local, and Federal Government agencies, affected industry, and the public, shall submit to Congress a report that describes the extent to which regulations promulgated under this paragraph have resulted in actions, including the design and maintenance of safe facilities, that are effective in detecting, preventing, and minimizing the consequences of releases of regulated substances that may be caused by criminal activity. As part of this report, the Attorney General, using available data to the extent possible, and a sampling of covered stationary sources selected at the discretion of the Attorney General, and in consultation with appropriate State, local, and Federal governmental agencies, affected industry, and the public, shall review the vulnerability of covered stationary sources to criminal and terrorist activity, current industry practices regarding site security, and security of transportation of regulated substances. The Attorney General shall submit this report, containing the results of the review, together with recommendations, if any, for reducing vulnerability of covered stationary sources to criminal and terrorist activity, to the Committee on Commerce of the United States

House of Representatives and the Committee on Environment and Public Works of the United States Senate and other relevant committees of Congress.

(II) Interim report. Not later than 12 months after the date of enactment of this subparagraph [enacted Aug. 5, 1999], the Attorney General shall submit to the Committee on Commerce of the United States House of Representatives and the Committee on Environment and Public Works of the United States Senate, and other relevant committees of Congress, an interim report that includes, at a minimum—

(aa) the preliminary findings under subclause (I);

(bb) the methods used to develop the findings; and

(cc) an explanation of the activities expected to occur that could cause the findings of the report under subclause (I) to be different than the preliminary findings.

(III) Availability of information. Information that is developed by the Attorney General or requested by the Attorney General and received from a covered stationary source for the purpose of conducting the review under subclauses (I) and (II) shall be exempt from disclosure under section 552 of title 5, United States Code, if such information would pose a threat to national security.

(xii) Scope. This subparagraph—

(I) applies only to covered persons; and

(II) does not restrict the dissemination of off-site consequence analysis information by any covered person in any manner or form except in the

form of a risk management plan or an electronic data base created by the Administrator from off-site consequence analysis information.

(xiii) Authorization of appropriations. There are authorized to be appropriated to the Administrator and the Attorney General such sums as are necessary to carry out this subparagraph (including the regulations promulgated under clause (ii)), to remain available until expended.

(8) Research on hazard assessments. The Administrator may collect and publish information on accident scenarios and consequences covering a range of possible events for substances listed under paragraph (3). The Administrator shall establish a program of long-term research to develop and disseminate information on methods and techniques for hazard assessment which may be useful in improving and validating the procedures employed in the preparation of hazard assessments under this subsection.

(9) Order authority.

(A) In addition to any other action taken, when the Administrator determines that there may be an imminent and substantial endangerment to the human health or welfare or the environment because of an actual or threatened accidental release of a regulated substance, the Administrator may secure such relief as may be necessary to abate such danger or threat, and the district court of the United States in the district in which the threat occurs shall have jurisdiction to grant such relief as the public interest and the equities of the case may require. The Administrator may al-so, after notice to the State in which the stationary source is located, take other action under this paragraph including, but not limited

to, issuing such orders as may be necessary to protect human health. The Administrator shall take action under section 303 [42 USCS § 7603] rather than this paragraph whenever the authority of such section is adequate to protect human health and the environment.

(B) Orders issued pursuant to this paragraph may be enforced in an action brought in the appropriate United States district court as if the order were issued under section 303 [42 USCS § 7603].

(C) Within 180 days after enactment of the Clean Air Act Amendments of 1990, the Administrator shall publish guidance for using the order authorities established by this paragraph. Such guidance shall provide for the coordinated use of the authorities of this paragraph with other emergency powers authorized by section 106 of the Comprehensive Environmental Response, Compensation and Liability Act [42 USCS § 9606], sections 311(c), 308, 309 and 504(a) of the Federal Water Pollution Control Act [33 USCS §§ 1321(c), 1318, 1319, and 1364(a)], sections 3007, 3008, 3013, and 7003 of the Solid Waste Disposal Act [42 USCS §§ 6927, 6928, 6934, and 6973], sections 1445 and 1431 of the Safe Drinking Water Act [42 USCS §§ 300j-4 and 300i], sections 5 and 7 of the Toxic Substances Control Act [15 USCS §§ 2604 and 2606], and sections 113, 114, and 303 of this Act [42 USCS §§ 7413, 7414, and 7603].

(10) Presidential review. The President shall conduct a review of release prevention, mitigation and response authorities of the various Federal agencies and shall clarify and coordinate agency responsibilities to assure the most effective and efficient implementation of such authorities and to identify any deficiencies in authority or resources which may exist.

The President may utilize the resources and solicit the recommendations of the Chemical Safety and Hazard Investigation Board in conducting such review. At the conclusion of such review, but not later than 24 months after the date of enactment of the Clean Air Act Amendments of 1990, the President shall transmit a message to the Congress on the release prevention, mitigation and response activities of the Federal Government making such recommendations for change in law as the President may deem appropriate. Nothing in this paragraph shall be interpreted, construed or applied to authorize the President to modify or reassign release prevention, mitigation or response authorities otherwise established by law.

(11) State authority. Nothing in this subsection shall preclude, deny or limit any right of a State or political subdivision thereof to adopt or enforce any regulation, requirement, limitation or standard (including any procedural requirement) that is more stringent than a regulation, requirement, limitation or standard in effect under this subsection or that applies to a substance not subject to this subsection.

(s) Periodic report. Not later than January 15, 1993 and every 3 years thereafter, the Administrator shall prepare and transmit to the Congress a comprehensive report on the measures taken by the Agency and by the States to implement the provisions of this section. The Administrator shall maintain a database on pollutants and sources subject to the provisions of this section and shall include aggregate information from the database in each annual report. The report shall include, but not be limited to—

(1) a status report on standard-setting under subsections (d) and (f);

(2) information with respect to compliance with such standards including the costs of compliance experienced by sources in various categories and subcategories;

(3) development and implementation of the national urban air toxics program; and

(4) recommendations of the Chemical Safety and Hazard Investigation Board with respect to the prevention and mitigation of accidental releases.

APPENDIX D

FEDERAL REGISTER

Vol. 77, No. 032

Rules and Regulations

ENVIRONMENTAL PROTECTION AGENCY (EPA)
40 CFR Parts 60 and 63 [EPA-HQ-OAR-2009-0234; EPA-HQ-OAR-2011-0044, FRL-9611-4]

RIN 2060-AP52; RIN 2060-AR31

National Emission Standards for Hazardous Air Pollutants From Coal-and Oil-Fired Electric Utility Steam Generating Units and Standards of Performance for Fossil-Fuel-Fired Electric Utility, Industrial-Commercial-Institutional, and Small Industrial-Commercial-Institutional Steam Generating Units

Part II

View PDF of Federal Register Print Version

77 FR 9304

DATE: Thursday, February 16, 2012

ACTION: Final rule.

SUMMARY: On May 3, 2011, under authority of Clean Air Act (CAA) sections 111 and 112, the EPA proposed both national emission standards for hazardous air pollutants (NESHAP) from coal- and oil-fired electric utility steam generating units (EGUs) and standards of performance for fossil-fuel-fired electric utility, industrial-commercial-institutional, and small industrial-commercial-institutional steam generating units (76 FR 24976). After consideration of public comments, the EPA is finalizing these rules in this action.

Pursuant to CAA section 111, the EPA is revising standards of performance in response to a voluntary remand of a final rule. Specifically, we are amending new source performance standards (NSPS) after analysis of the public comments we received. We are also finalizing several minor amendments, technical clarifications, and corrections to existing NSPS provisions for fossil fuel-fired EGUs and large and small industrial-commercial-institutional steam generating units.

Pursuant to CAA section 112, the EPA is establishing NESHAP that will require coal- and oil-fired EGUs to meet hazardous air pollutant (HAP) standards reflecting the application of the maximum achievable control technology. This rule protects air quality and promotes public health by reducing emissions of the HAP listed in CAA section 112(b)(1).

EFFECTIVE DATE: This final rule is effective on April 16, 2012. The incorporation by reference of certain publications listed in this rule is approved by the Director of the Federal Register as of April 16, 2012.

ADDRESSES: The EPA established two dockets for this action: Docket ID. No. EPA-HQ-OAR-2011-0044 (NSPS action) or Docket ID No. EPA-HQ-OAR-2009-0234 (NESHAP action). All documents in the dockets are listed on the http://www.regulations.gov Web site. Although listed in the index, some information is not publicly available, e.g., confidential business information or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, is not placed on the Internet and will be publicly available only in hard copy form. Publicly available docket materials are available either electronically through http://www.

regulations.gov or in hard copy at EPA's Docket Center, Public Reading Room, EPA West Building, Room 3334, 1301 Constitution Avenue NW., Washington, DC 20004. This Docket Facility is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The telephone number for the Public Reading Room is (202) 566-1744, and the telephone number for the Air Docket is (202) 566-1741.

FOR FURTHER INFORMATION CONTACT: For the NESHAP action: Mr. William Maxwell, Energy Strategies Group, Sector Policies and Programs Division, (D243-01), Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711; Telephone number: (919) 541-5430; Fax number (919) 541-5450; Email address: maxwell.bill@epa.gov. For the NSPS action: Mr. Christian Fellner, Energy Strategies Group, Sector Policies and Programs Division, (D243-01), Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711; Telephone number: (919) 541-4003; Fax number (919) 541-5450; Email address: fellner.christian@epa.gov.

SUPPLEMENTARY INFORMATION:

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I. General Information

A. Does this action apply to me?

The regulated categories and entities potentially affected by the final standards are shown in Table 1 of this pre-amble.

Table 1—Potentially Affected Regulated Categories and Entities

Category	NAICS code[1]	Examples of potentially regulated entities
Industry	221112	Fossil fuel-fired electric utility steam generating units.
Federal government	221122[2]	Fossil fuel-fired electric utility steam generating units owned by the federal government.
State/local/ tribal	221122[2]	Fossil fuel-fired government electric utility steam generating units owned by states, tribes, or municipalities.
	921150	Fossil fuel-fired electric utility steam generating units in Indian country.

[1] North American Industry Classification System.

[2] Federal, state, or local government-owned and operated establishments are classified according to the activity in which they are engaged.

This table is not intended to be exhaustive, but rather is meant to provide a guide for readers regarding entities likely to be affected by this action. To determine whether you, as owner or operator of a facility, company, business, organization, etc., will be regulated by this action, you should examine the applicability criteria in 40 CFR 60.40, 60.40Da, or 60.40c or in 40 CFR 63.9981. If you have any questions regarding the applicability of this action to a particular entity, consult either the air permitting authority for the entity or your EPA regional rep-

resentative as listed in 40 CFR 60.4 or 40 CFR 63.13 (General Provisions).

B. Where can I get a copy of this document?

In addition to being available in the dockets, an electronic copy of this action will also be available on the Worldwide Web (WWW) through the Technology Transfer Network (TTN). Following signature by the Administrator, a copy of the action will be posted on the TTN's policy and guidance page for newly proposed or promulgated rules at the following address: http://www.epa.gov/ttn/oarpg/. The TTN provides information and technology exchange in various areas of air pollution control.

C. Judicial Review

Under CAA section 307(b)(1), judicial review of this final rule is available only by filing a petition for review in the U.S. Court of Appeals for the District of Columbia Circuit by April 16, 2012. Under CAA section 307(d)(7)(B), only an objection to this final rule that was raised with reasonable specificity during the period for public comment (including any public hearing) can be raised during judicial review. This section also provides a mechanism for the EPA to convene a proceeding for reconsideration, "[i]f the person raising an objection can demonstrate to the Administrator that it was impracticable to raise such objection within [the period for public comment] or if the grounds for such objection arose after the period for public comment (but within the time specified for judicial review) and if such objection is of central relevance to the outcome of the rule[.]" Any person seeking to make such a demonstration to us should submit a Petition for Reconsideration to the Office of the Administrator, Environmental Protection Agency,

Room 3000, Ariel Rios Building, 1200 Pennsylvania Ave. NW., Washington, DC 20004, with a copy to the person listed in the preceding **FOR FURTHER INFORMATION CONTACT** section, and the Associate General Counsel for the Air and Radiation Law Office, Office of General Counsel (Mail Code 2344A), Environmental Protection Agency, 1200 Pennsylvania Ave. NW., Washington, DC 20004. Note, under CAA section 307(b)(2), the requirements established by this final rule may not be challenged separately in any civil or criminal proceedings brought by EPA to enforce these requirements.

D. What are the costs and benefits of this final rule?

Consistent with Executive Order (EO) 13563, "Improving Regulation and Regulatory Review," we have estimated the costs and benefits of the final rule. This rule will reduce emissions of HAP, including mercury (Hg), from the electric power industry. Installing the technology necessary to reduce emissions directly regulated by this rule will also reduce the emissions of directly emitted $PM_{2.5}$ and sulfur dioxide (SO_2), a $PM_{2.5}$ precursor. The benefits associated with these PM and SO_2 reductions are referred to as co-benefits, as these reductions are not the primary objective of this rule.

The EPA estimates that this final rule will yield annual monetized benefits (in 2007] of between $ 37 to $ 90 billion using a 3 percent discount rate and $ 33 to $ 81 billion using a 7 percent discount rate. The great majority of the estimates are attributable to co-benefits from reductions in PM[2.5] -related mortality. The annual social costs, approximated by the sum of the compliance costs and monitoring and reporting costs, are $ 9.6 billion (2007] and the annual quantified net benefits (the difference between

benefits and costs) are $ 27 to $ 80 billion using a 3 percent discount rate or $ 24 to $ 71 billion using a 7 percent discount rate. It is important to note that the PM[2.5] co-benefits reported here contain uncertainty, due in part to the important assumption that all fine particles are equally potent in causing premature mortality and because many of the benefits are associated with reducing PM[2.5] levels at the low end of the concentration distributions examined in the epidemiology studies from which the PM[2.5]-mortality relationships used in this analysis are derived.

The benefits of this rule outweigh costs by between 3 to 1 or 9 to 1 depending on the benefit estimate and discount rate used. The co-benefits are substantially attributable to the 4,200 to 11,000 fewer PM[2.5] related premature mortalities estimated to occur as a result of this rule. The EPA could not monetize some costs and important benefits, such as some Hg benefits and those for the HAP reduced by this final rule other than Hg. Upon considering these limitations and uncertainties, it remains clear that the benefits of this rule, referred to in short as the Mercury and Air Toxics Standards (MATS), are substantial and far outweigh the costs.

Table 2—Summary of the Monetized Benefits, Social Costs, and Net Benefits for the Final Rule in 2016 [Billions of 2007$][a]

	3% Discount rate	7% Discount rate
Total Monetized Benefits[b].....	$37 to $90.....	$33 to $81
Partial Hg-related Benefits[c].	$ 0.004 to $ 0.006.....	$ 0.0005 to $ 0.001
$PM_{2.5}$-related[b].....	$36 to $89.....	$33 to $80
Climate-related Co-benefits[d]	$0.36.....	$0.36
Total Social Costs[e].....	$9.6.....	$9.6
Net benefits.....	$27 to $80.....	$24 to $71
Non-monetized Benefits.....	Visibility in Class I areas. Other neurological effects of Hg exposure. Other health effects of Hg exposure. Health effects of ozone and direct exposure to SO_2 and NO_2. Ecosystem effects. Health effects from ommercial and non-freshwater fish consumption. Health risks from exposure to non-mercury HAP.	

[a] All estimates are for 2016, and are rounded to two significant figures.

[b] The total monetized benefits reflect the human health benefits associated with reducing exposure to PM[2.5]. The reduction in premature fatalities each year accounts for over 90 percent of total monetized benefits. Benefits in this table are nationwide and are associated with directly emitted PM[2.5] and SO[2] reductions. The estimate of social benefits also includes CO[2]-related benefits calculated using the social cost of carbon, discussed further in chapter 5 of the RIA. Mercury benefits were calculated using the baseline from proposal. The difference in emissions reductions between proposal and final does not substantially affect the Hg benefits.

[c] Based on an analysis of health effects due to recreational freshwater fish consumption.

[d] This table shows monetized CO_2 co-benefits that were calculated using the global average social cost of carbon estimate at a 3 percent discount rate. In section 5.6 of the Regulatory Impact Analysis (RIA) we also report the monetized CO_2 co-benefits using discount rates of 5 percent, 2.5 percent, and 3 percent (95th percentile).

[e] Total social costs are approximated by the compliance costs for both coal-and oil-fired units. This includes monitoring, recordkeeping, and reporting costs.

For more information on how EPA is addressing EO 13563, see the EO discussion in the Statutory and Executive Order Reviews section of this preamble.

II. Background Information on the NESHAP

On May 3, 2011, the EPA proposed this rule to address emissions of toxic air pollutants from coal and oil-fired electric generating units as required by the CAA. The proposal explained at length the statutory history and requirements leading to this rule, the factual and legal basis for the rule and its specific provisions, and the costs and benefits to the public health and environment from the proposed requirements.

The EPA received over 900,000 comments from members of the public on the proposed rule, substantially more than for any other prior regulatory proposal. The comments express concerns about the presence of Hg in the environment and the effect it has on human health, concerns about the costs of the rule, how challenging it may be for some sources to comply and questions about the impact it may have on this country's electricity supply and economy. Many comments provided additional information and data that have enriched the factual record and enabled EPA

to finalize a rule that fulfills the mandate of the CAA while providing flexibility and compliance options to affected sources—options that make the rule less costly and compliance more readily manageable.

This rule establishes uniform emissions-control standards that sources can meet with proven and available technologies and operational processes in a timeframe that is achievable. They will put this industry, now the single largest source of Hg emissions in the United States (U.S.) with emissions of 29 tons per year, on a path to reducing those emissions by approximately 90 percent. Emissions of other toxic metals, such as arsenic (As) and nickel (Ni), dioxins and furans, acid gases (including hydrochloric acid (HCl) and SO_2 will also decrease dramatically with the installation of pollution controls. And the flexibilities established in this rule along with other available tools provide a clear pathway to compliance without jeopardizing the country's energy supply.

This preamble explains EPA's appropriate and necessary finding, the elements of the final rule, key changes the EPA is making in response to comments submitted on the proposed rule, and our responses to many of the comments we received. A full response to comments is provided in the response to comments document available in the docket for this rulemaking.

A. What is the statutory authority for this final rule?

Congress established a specific structure for determining whether to regulate EGUs under CAA section

112.[1] Specifically, Congress enacted CAA section 112(n)(1).

Section 112(n)(1)(A) of the CAA requires the EPA to conduct a study to evaluate the remaining public health hazards that are reasonably anticipated to occur as a result of EGUs' HAP emissions after imposition of CAA requirements. The EPA must report the results of that study to Congress, and regulate EGUs "if the Administrator finds such regulation is appropriate and necessary," after considering the results of that study. Thus, CAA section 112(n)(1)(A) governs how the Administrator decides whether to list EGUs for regulation under CAA section 112. *See New Jersey v. EPA*, 517 F.3d 574 at 582 (D.C. Cir. 2008) ("Section 112(n)(1) governs how the Administrator decides whether to list EGUs; it says nothing about delisting EGUs.").

As directed, the EPA conducted the study to evaluate the remaining public health hazards and reported the results to Congress (Utility Study Report to Congress (Utility Study)).[2] We discuss this study below in conjunction with other studies that CAA section 112(n)(1) requires concerning EGUs. See also 76 FR 24982-24984 (summarizing studies).

Once the EPA lists a source category pursuant to CAA section 112(c), the EPA must then establish technology-based emission standards under CAA

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[1] "Electric utility steam generating unit" is defined, in part, as any "fossil fuel fired combustion unit of more than 25 megawatts that serves a [1]generator that produces electricity for sale." See CAA section 112(a)(8).

[2] U.S. EPA. Study of Hazardous Air Pollutant Emissions from Electric Utility Steam Generating Units—Final Report to Congress. EPA-453/R-98-004a. February 1998.

section 112(d). For major sources, the EPA must establish emission standards that "require the maximum degree of reduction in emissions of the hazardous air pollutants subject to this section "that the EPA determines are achievable taking into account certain statutory factors. See CAA section 112(d)(2). These standards are referred to as "maximum achievable control technology" or "MACT" standards. The MACT standards for existing sources must be at least as stringent as the average emission limitation achieved by the best performing 12 percent of existing sources in the category (for which the Administrator has emissions information) or the best performing 5 sources for source categories with less than 30 sources. See CAA section 112(d)(3)(A) and (B), respectively. This level of minimum stringency is referred to as the "MACT floor," and the EPA cannot consider cost in setting the floor. For new sources, MACT standards must be at least as stringent as the control level achieved in practice by the best controlled similar source. See CAA section 112(d)(3).

The EPA also must consider more stringent "beyond-the-floor" control options. When considering beyond-the-floor options, the EPA must consider the maximum degree of reduction in HAP emissions and take into account costs, energy, and non-air quality health and environmental impacts when doing so. *See Cement Kiln Recycling Coal. v. EPA*, 255 F.3d 855, 857-58 (D.C. Cir. 2001).

Alternatively, the EPA may set a health-based standard for HAP that have an established health threshold, and the standard must provide "an ample margin of safety." *See* CAA section 112(d)(4). As these standards could be less stringent than MACT standards, the Agency must have detailed information

on HAP emissions from the subject sources and sources located near the subject sources before exercising its discretion to set such standards.

For area sources, the EPA may issue standards or requirements that provide for the use of generally available control technologies or management practices (GACT standards) in lieu of promulgating MACT or health-based standards. *See* CAA section 112(d)(5).

As noted above, CAA section 112(n) requires completion of various reports concerning EGUs. For the first report, the Utility Study, Congress required the EPA to evaluate the hazards to public health reasonably anticipated to occur as the result of HAP emissions from EGUs after imposition of the requirements of the CAA. *See* CAA section 112(n)(1)(A). The EPA was required to report results from this study to Congress by November 15, 1993. *Id.* Congress also directed the EPA to conduct "a study of mercury emissions from [EGUs], municipal waste combustion units, and other sources, including area sources" (Mercury Study). *See* CAA section 112(n)(1)(B). The EPA was required to report the results from this study to Congress by November 15, 1994. *Id.* In conducting this Mercury Study, Congress directed the EPA to "consider the rate and mass of such emissions, the health and environmental effects of such emissions, technologies which are available to control such emissions, and the costs of such technologies." *Id.* Congress directed the National Institute of Environmental Health Sciences (NIEHS) to conduct the last required evaluation, "a study to determine the threshold level of mercury exposure below which adverse human health effects are not expected to occur" (NIEHS Study). *See* CAA section 112(n)(1)(C). The NIEHS was required to submit the results to

Congress by November 15, 1993. *Id.* In conducting this study, NIEHS was to determine "a threshold for mercury concentrations in the tissue of fish which may be consumed (including consumption by sensitive populations) without adverse effects to public health." *Id.*

In addition, Congress, in conference report language associated with the EPA's fiscal year 1999 appropriations, directed the EPA to fund the National Academy of Sciences (NAS) to perform an independent evaluation of the available data related to the health impacts of methylmercury (MeHg) (NAS Study or MeHg Study). H.R. Conf. Rep. No 105-769, at 281-282 (1998). Specifically, Congress required NAS to advise the EPA as to the appropriate reference dose (RfD) for MeHg. 65 FR 79826. The RfD is the amount of a chemical which, when ingested daily over a lifetime, is anticipated to be without adverse health effects to humans, including sensitive subpopulations. In the same conference report, Congress indicated that the EPA should not make the appropriate and necessary regulatory determination for Hg emissions until the EPA had reviewed the results of the NAS Study. *See* H.R. Conf. Rep. No 105-769, at 281-282 (1998).

As directed by Congress through different vehicles, the NAS Study and the NIEHS Study evaluated the same issues. The NIEHS completed the NIEHS Study in 1995,[3] and the NAS completed the NAS Study in 2000.[4] Because NAS completed its study 5

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[3] NIEHS Study, August 1995; EPA-HQ-OAR-2009-3053.

[4] National Research Council (NAS). 2000. Toxicological Effects of Methylmercury. Committee on the Toxicological Effects of Methylmercury, Board on Environmental Studies and Toxicology, National Research Council.

years after the NIEHS Study, and considered additional information not earlier available to NIEHS, for purposes of this document we discuss the content of the NAS Study as opposed to the NIEHS Study.

The EPA conducted the studies required by CAA section 112(n)(1) concerning utility HAP emissions, the Utility Study and the Mercury Study,[5] and completed both by 1998. Prior to issuance of the Mercury Study, the EPA engaged in two extensive external peer reviews of the document.

On December 20, 2000, the EPA issued a finding pursuant to CAA section 112(n)(1)(A) that it was appropriate and necessary to regulate coal- and oil-fired EGUs under CAA section 112 and added such units to the list of source categories subject to regulation under CAA section 112(d). In making that finding, the EPA considered the Utility Study, the Mercury Study, the NAS Study, and certain additional information, including information about Hg emissions from coal-fired EGUs that the EPA obtained pursuant to an information collection request (ICR) under the authority of CAA section 114. 65 FR 79826-27.

B. What is the litigation history of this final rule?

Shortly after issuance of the December 2000 finding, an industry group challenged that finding in the Court of Appeals for the D.C. Circuit (D.C. Circuit). *Utility Air Regulatory Group (UARG) v. EPA*, 2001 WL 936363, No. 01-1074 (D.C. Cir. July 26, 2001). The D.C. Circuit dismissed the lawsuit holding that it did not have jurisdiction because CAA section 112(e)(4)

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[5] Mercury Study Report to Congress, December 1997; EPA-HQ-OAR-2009-0234-3054.

provides, in pertinent part, that "no action of the Administrator * * * listing a source category or subcategory under subsection (c) of this section *shall be a final agency action subject to judicial* review, except that any such action may be reviewed under section 7607 of (the CAA) when the Administrator issues emission standards for such pollutant or category." *Id. (emphasis added).*

Pursuant to a settlement agreement, the deadline for issuing emission standards was March 15, 2005. However, instead of issuing emission standards pursuant to CAA section 112(d), on March 29, 2005, the EPA issued the Section 112(n) Revision Rule (2005 Action). That action delisted EGUs after finding that it was neither appropriate nor necessary to regulate such units under CAA section 112. In addition, on May 18, 2005, the EPA issued the Clean Air Mercury Rule (CAMR). 70 FR 28606. That rule established standards of performance for emissions of Hg from new and existing coal-fired EGUs pursuant to CAA section 111.

Environmental groups, states, and tribes challenged the 2005 Action and CAMR. Among other things, the environmental and state petitioners argued that the EPA could not remove EGUs from the CAA section 112(c) source category list without following the requirements of CAA section 112(c)(9).

On February 8, 2008, the D.C. Circuit vacated both the 2005 Action and CAMR. The D.C. Circuit held that the EPA failed to comply with the requirements of CAA section 112(c)(9) for delisting source categories. Specifically, the D.C. Circuit held that CAA section 112(c)(9) applies to the removal of "any source category" from the CAA section 112(c) list, including EGUs. The D.C. Circuit found that, by enacting CAA section 112(c)(9), Congress limited the EPA's

discretion to reverse itself and remove source categories from the CAA section 112(c) list. The D.C. Circuit found that the EPA's contrary position would "nullify § 112(c)(9) altogether." *New Jersey v. EPA*, 517 F.3d 574, 583 (D.C. Cir. 2008). The D.C. Circuit did not reach the merits of petitioners' arguments on CAMR, but vacated CAMR for existing sources because coal-fired EGUs were already listed sources under CAA section 112. The D.C. Circuit reasoned that even under the EPA's own interpretation of the CAA, regulation of existing sources' Hg emissions under CAA section 111 was prohibited if those sources were a listed source category under CAA section 112.[6] *Id.* The D.C. Circuit vacated and remanded CAMR for new sources because it concluded that the assumptions the EPA made when issuing CAMR for new sources were no longer accurate (i.e., that there would be no CAA section 112 regulation of EGUs and that the CAA section 111 standards would be accompanied by standards for existing sources). *Id.* at 583-84. Thus, CAMR and the 2005 Action became null and void.

On December 18, 2008, several environmental and public health organizations filed a complaint in the U.S. District Court for the District of Columbia.[7] They

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[6] In CAMR and the 2005 Action, EPA interpreted section 111(d) of the Act as prohibiting the Agency from establishing an existing source standard of performance under CAA section 111(d) for any HAP emitted from a particular source category, if the source category is regulated under CAA section 112.

[7] American Nurses Association, Chesapeake Bay Foundation, Inc., Conservation Law Foundation, Environment America, Environmental Defense Fund, Izaak Walton League of America, Natural Resources Council of Maine, Natural Resources Defense Council, Physicians for Social Responsibility, Sierra Club, The

alleged that the Agency had failed to perform a nondiscretionary duty under CAA section 304(a)(2), by failing to promulgate final CAA section 112(d) standards for HAP from coal- and oil-fired EGUs by the statutorily-mandated deadline, December 20, 2002, 2 years after such sources were listed under CAA section 112(c). The EPA settled that litigation. The consent decree resolving the case requires the EPA to sign a notice of proposed rulemaking setting forth the EPA's proposed CAA section 112(d) emission standards for coal- and oil-fired EGUs by March 16, 2011, and a notice of final rulemaking by December 16, 2011.[8]

C. What is the relationship between this final rule and other combustion rules?

1. CAA Section 111

The EPA promulgated revised NSPS for SO_2, nitrogen oxides (NO_x), and PM under CAA section 111 for EGUs (40 CFR part 60, subpart Da) and industrial boilers (IB) (40 CFR part 60, subparts Db and Dc) on February 27, 2006 (71 FR 9866). As noted elsewhere, in this action we are finalizing certain amendments to 40 CFR part 60, subpart Da. In developing this final rule, we considered the monitoring, testing, and

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Ohio Environmental Council, and Waterkeeper Alliance, Inc. (Civ. No. 1:08-cv-02198 (RMC)).

[8] The consent decree originally required EPA to sign a notice of final rulemaking no later than November 16, 2011; however, on October 21, 2011, pursuant to paragraph 6 of the consent decree, the parties agreed to a 30-day extension of the final rule deadline. As stated in the stipulation memorializing the extension, the parties agreed to the extension of 30 days because EPA provided an additional 30 days for public comment and the time was necessary to respond to comments submitted on the proposed rule.

recordkeeping requirements of the existing and revised NSPS to avoid duplicating requirements to the extent possible.

2. CAA Section 112

The EPA has previously developed other non-EGU combustion-related NESHAP under CAA section 112(d). The EPA promulgated final NESHAP for major source industrial, commercial and institutional boilers and process heaters (IB) and area source industrial, commercial and institutional boilers on March 21, 2011 (40 CFR part 63, subpart DDDDD, 76 FR 15608; and subpart JJJJJJ, 76 FR 15249, respectively), and promulgated standards for stationary combustion turbines (CT) on March 5, 2004 (40 CFR part 63 subpart YYYY; 69 FR 10512). In addition to these three NESHAP, on March 21, 2011, the EPA also promulgated final CAA section 129 standards for commercial and institutional solid waste incineration (CISWI) units, including energy recovery units (40 CFR part 60, subparts CCCC (NSPS) and DDDD (emission guidelines); 76 FR 15704); and a definition of non-hazardous secondary materials that are solid waste (Non-hazardous Solid Waste Definition Rule (40 CFR part 241, subpart B; 76 FR 15456)). Electric generating units and IB that combust fossil fuel and solid waste, as that term is defined by the Administrator pursuant to the Resource Conservation and Recovery Act (RCRA), *See* 76 FR 15456, will be subject to standards issued pursuant to CAA section 129 (*e.g.*, CISWI), unless they meet one of the exemptions in CAA section 129(g)(1). Clean Air Act section 129 standards are discussed in more detail below.

The two IB (Boiler) NESHAP, the CT NESHAP, and this final rule will regulate HAP emissions from sources that combust fossil fuels for electrical power,

process operations, or heating. The differences among these rules are due to the size of the units (megawatt (MW), megawatt-electric (MWe), or British thermal unit per hour (Btu/hr)). the boiler/furnace technology, and/or the portion of their electrical output (if any) for sale to any utility power distribution systems.

Pursuant to the CAA, an EGU is "any fossil fuel fired combustion unit of more than 25 megawatts that serves a generator that produces electricity for sale. A unit that cogenerates steam and electricity and supplies more than one-third of its potential electric output capacity and more than 25 megawatts electrical output to any utility power distribution system for sale shall be considered an electric utility steam generating unit." CAA section 112(a)(8). We consider all of the MW ratings quoted in the final rule to be the original rated nameplate capacity of the unit. We consider cogeneration to be the simultaneous production of power (electricity) and another form of useful thermal energy (usually steam or hot water) from a single fuel-consuming process.

We consider any combustion unit, regardless of size, that produces steam to serve a generator that produces electricity exclusively for industrial, commercial, or institutional purposes (i.e., makes no sales to the national electrical distribution grid) to be an IB unit. We do not consider a fossil fuel-fired combustion unit that serves a generator that produces electricity for sale to be an EGU under the final rule if the size of the combustion unit is less than or equal to 25 MW. Units that are 25 MW or less are likely subject to one of the two Boiler NESHAP.

Because of the combustion technology of simple-cycle and combined-cycle stationary CTs (with the exception of integrated gasification combined cycle

(IGCC) units that burn gasified coal or petroleum coke synthesis gas/syngas), we do not consider these CTs to be EGUs for purposes of this final rule.[9]

The December 2000 listing discussed above did not list natural gas-fired EGUs. Thus, this final rule does not regulate a unit that otherwise meets the CAA section 112(a)(8) definition of an EGU but that combusts natural gas exclusively or natural gas in combination with another fossil fuel where the natural gas constitutes 90.0 percent or more of the average annual heat input during any 3 consecutive calendar years or 85.0 percent or more of the annual heat input in one calendar year. We consider such units to be natural gas-fired EGUs notwithstanding the combustion of some coal or oil (or derivative thereof) and such units are not subject to this final rule.

The CAA does not define the terms "fossil fuel-fired" and "fossil fuel." In this rule, we are finalizing definitions for both terms for purposes of this rule. The definition of "fossil fuel-fired" will help determine the applicability of the final rule to combustion units that sell electricity to the utility power distribution system. The definition of "fossil fuel-fired" establishes the amount of fossil fuel combustion necessary to make a unit "fossil fuel-fired" and hence potentially subject to this final rule. These definitions will help determine applicability of the final rule to units that primarily fire non-fossil fuels (e.g., biomass) but generally start up using either natural gas or distillate oil and may use these fuels (or coal) during normal operation for flame stabilization.

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[9] The CT NESHAP regulates HAP emissions from all simple-cycle and combined-cycle stationary CTs producing electricity or steam for any purpose.

In addition, the EPA is finalizing in the definition of "fossil fuel-fired" that, among other things, an EGU must fire coal or oil for more than 10.0 percent of the average annual heat input during any 3 consecutive calendar years or for more than 15.0 percent of the annual heat input during any one calendar year after the applicable compliance date in order to be considered a fossil fuel-fired EGU subject to this final rule. The EPA has based these threshold percentage values on the definition of "oil-fired" in the Acid Rain Program (ARP) found at 40 CFR 72.2. Though the EPA does not have annual heat input data for, for example, biomass co-fired EGUs because their use is not yet commonplace, we believe this definition accounts for the use of fossil fuels for flame stabilization use without inappropriately subjecting such units to this final rule.

Units that do not meet the EGU definition will in most cases be considered IB units subject to one of the two Boiler NESHAP. Thus, for example, a biomass-fired EGU, regardless of size, that utilizes fossil fuels for startup and flame stabilization purposes only (*i.e.*, less than or equal to 10.0 percent of the average annual heat input in any 3 consecutive calendar years or less than or equal to 15.0 percent of the annual heat input during any one calendar year) is not considered to be a fossil fuel-fired EGU under this final rule.

A cogeneration facility that sells electricity to any utility power distribution system equal to more than one-third of its potential electric output capacity and more than 25 MW will be considered an EGU if the facility is fossil fuel-fired as that term is defined in the final rule.

We recognize that different CAA section 112 rules may impact a particular unit at different times. For example, the Boiler NESHAP may cover some cogeneration units. Such a unit may decide to increase or decrease the proportion of production output it supplies to the electric utility grid, thus causing the unit to meet the EGU cogeneration criteria (*i.e.*, greater than one-third of its potential output capacity and greater than 25 MW). A unit subject to one of the Boiler NESHAP that increases its electricity output and meets the definition of an EGU would be subject to the final EGU NESHAP.

Another rule intersection may occur where one or more coal-or oil-fired EGU(s) share an air pollution control device (APCD) and/or an exhaust stack with one or more similarly-fueled IB unit(s). To demonstrate compliance with two different rules, either the emissions would need to be apportioned to the appropriate source or the more stringent emission limit would need to be met. Data needed to apportion emissions are not currently required by this final rule or the final boiler NESHAP and are not otherwise available. Therefore, the EPA is finalizing the requirement to comply with the more stringent emission limit.

3. CAA Section 129

Clean Air Act section 129 regulates units that combust "non-hazardous secondary materials," as that term is defined by the Administrator under the Resource Conservation and Recovery Act (RCRA), that are "solid wastes." On March 21, 2011, the EPA promulgated the final Non-Hazardous Solid Waste Definition Rule (76 FR 15456). Any EGU that combusts any solid waste as defined in that final rule is a

solid waste incineration unit subject to emissions standards under CAA section 129.

In the Non-Hazardous Solid Waste Definition Rule, the EPA determined that coal refuse from current mining operations is not considered to be a "solid waste" if it is not discarded. Coal refuse that is in legacy coal refuse piles is considered a "solid waste" because it has been discarded. However, if discarded coal refuse is processed in the same manner as currently mined coal refuse, the coal refuse would not be considered a solid waste but instead would be considered a product fossil fuel. Therefore, the combustion of such material by a combustion unit would not subject that unit to regulation under CAA section 129. Instead, the unit would be subject to this final rule if it meets the definition of EGU. In the proposed rule, we assumed that all units that combust coal refuse and otherwise meet the definition of a coal-fired EGU are in fact combusting newly mined coal refuse or coal refuse from legacy piles that has been processed such that it is not a solid waste. We did not receive any information since proposal that would cause us to revise this determination in the final rule.

Further, CAA section 129(g)(1)(B) exempts from regulation

> "* * * qualifying small power production facilities, as defined in section 796(17)(C) of Title 16, or qualifying co-generation facilities, as defined in section 796-(18)(B) of Title 16, which burn homogeneous waste * * * for the production of electric energy or in the case of qualifying cogeneration facilities which burn homogeneous waste for the production of electric energy and steam or forms of useful energy (such as heat) which are used for

industrial, commercial, heating or cooling purposes * * *"

If the "homogeneous waste" material that such facilities combust is also a fossil fuel, and those facilities otherwise meet the definition of an EGU under CAA section 112(a)(8), then those facilities are exempt from regulation under CAA section 129 but covered under this final rule. For example, a qualifying small power production facility or cogeneration facility combusting only coal refuse that is a solid waste and a "homogenous waste," as that term is defined in the final CAA section 129 CISWI standards, would be subject to this final rule if the unit also met the definition of EGU.

D. What are the health effects of pollutants emitted from coal- and oil-fired EGUs?

This final rule protects air quality and promotes public health by reducing emissions of some of the HAP listed in CAA section 112(b)(1). Utilities are by far the largest anthropogenic source of Hg in the U.S. In addition, EGUs are the largest source of HCl, hydrogen fluoride (HF), and selenium (Se) emissions, and a major source of metallic HAP emissions including As, chromium (Cr), Ni, and others. The discrepancy is even greater now that almost all other major source categories have been required to control Hg and other HAP under CAA section 112. In 2005, U.S. EGUs emitted 50 percent of total domestic anthropogenic Hg emissions, 62 percent of total As emissions, 39 percent of total cadmium (Cd) emissions, 22 percent of total Cr emissions, 82 percent of total HCl emissions, 62 percent of total HF emissions, 28 percent of total Ni emissions, and 83

percent of total Se emissions.[10] Exposure to these HAP, depending on exposure duration and levels of exposures, is associated with a variety of adverse health effects. These adverse health effects may include chronic health disorders (*e.g.*, irritation of the lung, skin, and mucus membranes; detrimental effects on the central nervous system; damage to the kidneys; and alimentary effects such as nausea and vomiting). Two of the HAP are classified as human carcinogens (As and CrVI) and two as probable human carcinogens (Cd and Ni). See 76 FR 25003-25005 for a fuller discussion of the health effects associated with these pollutants.

III. Appropriate and Necessary Finding

A. Overview

In December 2000, the EPA issued a finding pursuant to CAA section 112(n)(1)(A) that it was appropriate and necessary to regulate coal- and oil-fired EGUs under CAA section 112 and added such units to the list of source categories subject to regulation under section 112(d). The EPA found that it was appropriate to regulate HAP emissions from coal- and oil-fired EGUs because, among other reasons, Hg is a hazard to public health, and U.S. EGUs are the largest domestic source of Hg emissions. The EPA also found it appropriate to regulate HAP emissions from EGUs because it had identified certain control options that would effectively reduce HAP emissions from U.S. EGUs. The EPA found that it was necessary to regulate HAP emissions from U.S. EGUs under section 112 because the implementation of other requirements under the CAA will not adequately

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[10] From 2005 National-Scale Air Toxics Assessment (NATA), available at http://www.epa.gov/ttn/atw/nata2005/.

address the serious public health and environmental hazards arising from HAP emissions from U.S. EGUs and that CAA section 112 is intended to address HAP emissions. See 76 FR 24984-20985 (for further discussion of 2000 finding).

Because several years had passed since the 2000 finding, the EPA performed additional technical analyses for the proposed rule, even though those analyses were not required. These analyses included a national-scale Hg risk assessment focused on populations with high levels of self-caught fish consumption, and a set of 16 case studies of inhalation cancer risks for non-Hg HAP. The analyses confirm that it remains appropriate and necessary to regulate U.S. EGUs under section 112.

In the preamble to the proposed rule, the EPA reported the results of those additional technical analyses. Those analyses confirmed the 2000 finding that it is appropriate to regulate U.S. EGUs under section 112 by demonstrating that (1) Hg continues to pose a hazard to public health because up to 28 percent of watersheds were estimated to have Hg deposition attributable to U.S. EGUs that contributes to potential exposures above the reference dose for methyl-mercury (MeHg RfD), a level above which there is increased risk of neurological effects in children, (2) non-Hg HAP emissions pose a hazard to public health because case studies at 16 facilities demonstrated that lifetime cancer risks at 4 of the facilities exceed 1 in 1 million, and (3) U.S. EGUs remain the largest domestic source of Hg emissions and several HAP (e.g., HF, Se, HCl), and are among the largest contributors for other HAP (e.g., As, Cr, Ni, HCN). Thus, in the preamble to the proposed rule, the EPA found that Hg and non-Hg HAP emissions from

U.S. EGUs pose hazards to public health, which confirmed the 2000 finding and demonstrated that it remains appropriate to regulate U.S. EGUs under section 112.

In the preamble to the proposed rule, the EPA also found that it is appropriate to regulate U.S. EGUs because (1) Hg emissions pose a hazard to the environment and wildlife, adversely impacting species of fish-eating birds and mammals, (2) acid gas HAP pose a hazard to the environment because they contribute to aquatic acidification, and (3) effective controls are available to reduce Hg and non-Hg HAP emissions from U.S. EGUs.

The additional analyses reported in the preamble to the proposed rule also confirmed that it remains necessary to regulate U.S. EGU under CAA section 112. These analyses demonstrated that (1) Hg emissions from U.S. EGUs remaining in 2016 are reasonably anticipated to pose a hazard to public health after imposition of other CAA requirements, such as the Cross-State Air Pollution Rule (CSAPR); (2) U.S. EGUs are reasonably anticipated to remain the largest source of Hg in the U.S. and thus contribute to the risk associated with exposure to MeHg; (3) Hg emissions from U.S. EGUs after imposition of the requirements of the CAA were projected to be 29 tons per year in 2016, similar to levels of Hg emitted today, indicating that further substantial reductions in Hg emissions are not reasonably anticipated without federal regulations on Hg from U.S. EGUs; (4) we cannot be certain that the identified cancer risks attributable to non-Hg emissions from U.S. EGUs will be addressed through imposition of the requirements of the CAA because companies can use compliance strategies for criteria pollutants that do not achieve

HAP co-benefits (e.g., purchasing allowances in a trading program); and (5) we cannot ensure that Hg and non-Hg HAP emissions reductions achieved since 2005 would be permanent without federally binding regulations for Hg from U.S. EGUs.

Since issuance of the proposed rule, the EPA has conducted peer reviews of the national-scale Hg risk assessment (Hg Risk TSD) and the approach for estimating chromium and nickel inhalation cancer risk in the case studies.[11] [12] The peer review of the Hg Risk TSD was conducted by EPA's independent Science Advisory Board (SAB). The SAB stated that it "supports the overall design of and approach to the risk assessment and finds that it should provide an objective, reasonable, and credible determination of the potential for a public health hazard from mercury emitted from U.S. EGUs."[13] SAB recommended several improvements to the data, methods and documentation of the analyses, which EPA has fully addressed in the revised Hg Risk TSD.

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[11] U.S. EPA. 2011a. National-Scale Assessment of Mercury Risk to Populations with High Consumption of Self-caught Freshwater Fish In Support of the Appropriate and Necessary Finding for Coal- and Oil-Fired Electric Generating Units. Office of Air Quality Planning and Standards. November. EPA-452/R-11-009.

[12] U.S. EPA. 2011b. Supplement to Non-mercury Case Study Chronic Inhalation Risk Assessment for the Utility MACT Appropriate and Necessary Analysis. Office of Air Quality Planning and Standards. November.

[13] U.S. Environmental Protection Agency-Science Advisory Board (U.S. EPA-SAB). 2011. Peer Review of EPA's Draft National-Scale Mercury Risk Assessment. EPA-SAB-11-017. September. Available on the Internet at http://yosemite.epa.gov/sab/sabproduct.nsf/BCA23C5B7917F5BF8525791A0072CCA1/$File/EPA-SAB-11-017-unsigned.pdf.

As described in the revised Hg Risk TSD, after addressing comments from the peer review, the revised results show that up to 29 percent of modeled watersheds are estimated to have Hg deposition attributable to U.S. EGUs that contributes to potential exposures above the MeHg RfD, an increase of one percentage point from the results reported in the proposed rule. We conclude that Hg emissions from EGUs pose a hazard to public health based on the total of 29 percent of modeled watersheds at risk. Our analyses show that of the 29 percent of watersheds with population at-risk, in 10 percent of those watersheds U.S. EGU deposition alone without considering deposition from other sources would lead to potential exposures that exceed the MeHg RfD, and in 24 percent of those watersheds, total potential exposures to MeHg exceed the RfD and U.S. EGUs contribute at least 5 percent to Hg deposition.[14] [15] Each of these results independently supports our conclusion that Hg emissions from EGUs pose hazards to public health.

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[14] Because some watersheds with exposures sufficient to exceed the RfD with Hg deposition from U.S. EGUs alone without considering deposition from other sources also have U.S. EGU contributions of more than 5 percent of total Hg deposition, there is some overlap between the two risk metrics. This explains why the total percent of watersheds exceeding either risk metric is less than the sum of the individual risk metrics.

[15] Requiring at least a 5 percent EGU contribution is a conservative approach given the increasing risks associated with incremental exposures above the RfD. Because we are finding 24 percent of watersheds with populations potentially at risk even using this conservative approach, we have confidence that emissions of Hg from U.S. EGUs are causing a hazard to public health.

The peer review of the approach to estimate Ni and Cr cancer risk in the case studies also supported EPA's assess-ment. The EPA enhanced this analysis in response to the peer review and public comments. The results of those revised analyses show that 6 of 16 modeled facilities have lifetime cancer risks greater than 1 in a million, thus confirming that non-Hg HAP emissions from U.S. EGUs remain a hazard to public health. Given Congress' determination that categories of sources that emit HAP resulting in a lifetime cancer risk greater than 1 in a million should not be removed from the CAA section 112(c) source category list and should continue to be regulated under CAA section 112, the EPA con-cludes that risk above that level represents a hazard to public health.

Based on our consideration of the peer reviews, public comments, and our updated analyses, we confirm the find-ings that Hg and non-Hg HAP emissions from U.S. EGUs pose hazards to public health and that it remains appropriate to regulate U.S. EGUs under CAA section 112. We also conclude that it remains appropriate to regulate U.S. EGUs under CAA section 112 because of the magnitude of Hg and non-Hg emissions, environmental effects of Hg and certain non-Hg emissions, and the availability of controls to reduce HAP emissions from EGUs.

In addition, we conclude that the hazards to public health from Hg and non-Hg emissions from U.S. EGUs are reasonably anticipated to remain after imposition of the requirements of the CAA. The same is true for hazards to the environment. Thus, we confirm that it is necessary to regulate U.S. EGUs under CAA section 112.

B. Peer Review of the Hg Risk TSD Supporting the Appropriate and Necessary Finding for Coal and Oil-Fired EGUs and EPA Response

In the preamble to the proposed rule, the EPA stated that "in making the finding that it remains appropriate and necessary to regulate EGUs to address public health and environmental hazards associated with emissions of Hg and Non-Hg HAP from EGUs, the EPA determined that the Hg Risk TSD supporting EPA's 2011 review of U.S. EGU health impacts should be peer-reviewed."[16] We also indicated that due to the court-ordered schedule for the final rule, we planned to conduct the peer review as expeditiously as possible after issuance of the proposed rule, and that the results of the peer review and any EPA response would be published before the final rule. Due to the extension of the public comment period and the volume of public comments received on the analyses supporting the proposed rule, we were unable to publish EPA's response prior to signature of the final rule.

The EPA's response to the peer review the Hg Risk TSD is fully documented in the revised *Technical Support Document (TSD): National-Scale Assessment of Hg Risk to Populations of High Consumption of Self-Caught Fish In Support of the Appropriate and Necessary Finding for Coal and Oil-Fired Electric Generating Units*.[17] The following sections describe the peer review process that we followed, provide the peer review charge questions presented to the peer review panel, summarize the key recommendations from the

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[16] 76 FR 25012.

[17] U.S. EPA, 2011a.

peer review, and summarize our responses to those recommendations.

1. Summary of Peer Review Process

Peer review is consistent with EPA's open and transparent process to ensure that the Agency's scientific assessments and rulemakings are based on the best science available. This regulatory action was supported by the Hg Risk TSD, which is a highly influential scientific assessment. Therefore, the EPA conducted a peer review in accordance with OMB's Final Information Quality Bulletin for Peer Review n18[18] as described below. All the materials related to the peer review, including the SAB's final report, can be found in the docket for this rulemaking.

The EPA commissioned the peer review through EPA's SAB, which provides independent advice and peer review to EPA's Administrator on the scientific and technical aspects of environmental issues. The SAB convened a 22-member peer review committee. The SAB process for selecting the panel began with two Federal Register Notices requesting nominations for the Mercury Review Panel.[19] Based on nominations received, a list of potential panel members, along

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[18] Office of Management and Budget (OMB). 2004. Final Information Quality Bulletin for Peer Review. December. Available on the Internet at http://www.whitehouse.gov/omb/memoranda_fy2005_m05-03.

[19] 76 FR 10896 and 76 FR 17649. The first notice requested nominations to a Clean Air Scientific Advisory Committee (CASAC) panel. Upon review of the scope of the CASAC charter (resulting from a public comment received in response to the first notice), the SAB determined that it would be more appropriate to form a panel under the SAB, rather than CASAC. The second notice announced this change and requested nominations for the SAB panel.

with bio-sketches, was posted for public comment on the SAB Web site on April 15, 2011. The members of the Mercury Review Panel were announced on May 24, 2011. The membership of the panel included representatives of 16 academic institutions, 4 state health or environmental agencies, 1 federal agency, and 1 utility industry organization.[20] The panel held a public meeting in Research Triangle Park, NC, on June 15-17, 2011, which included the opportunity for public comment on the Hg Risk TSD and the peer review process.[21] At the June 15-17 public meeting, the panel completed a draft peer review report. The minutes of that meeting and the draft peer review report were posted to the SAB public Web site within the public comment period for the proposed rule. The panel discussed the draft report at a public teleconference on July 12, 2011, during which additional opportunities for public comment were provided,[22] and submitted a revised draft for quality review by the Chartered SAB before the end of the public comment period on the rule. The Chartered SAB held a public teleconference on September 7, 2011, to conduct a quality review of the draft report; this teleconference also included a final opportunity for public comment.[23] The SAB submitted its final report to EPA on September 29, 2011.[24] Notice of all the meetings was

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[20] The full list of panel members is documented at *http://yosemite.epa.gov/sab/sabproduct.nsf/0/9F048172004D93BB8525783900503486/$File/Determination%20memo%20with%20addendum-05.24.11.pdf.*

[21] 76 FR 29746.

[22] 76 FR 39102.

[23] 76 FR 50729.

[24] U.S. EPA-SAB, 2011. Peer Review of EPA's Draft National-Scale Mercury Risk Assessment.

published in the Federal Register and all of the materials discussed at the SAB meetings, including technical documents, presentations, meeting minutes, and draft reports were posted for public access on the SAB Web site[25] and were added to the docket for the final rule on October 14, 2011.

2. Peer Review Charge Questions

The EPA asked the SAB to comment on the Hg Risk TSD, including the overall design and approach and the use of specific models and key assumptions. The EPA also asked the SAB to comment on the extent to which specific facets of the assessment were well characterized in the Hg Risk TSD. The specific charge questions are listed below:

Question 1. Please comment on the scientific credibility of the overall design of the mercury risk assessment as an approach to characterize human health exposure and risk associated with U.S. EGU mercury emissions (with a focus on those more highly exposed).

Question 2. Are there any additional critical health endpoint(s) besides IQ loss, which could be quantitatively estimated with a reasonable degree of confidence to supplement the mercury risk assessment (*see* section 1.2 of the Mercury Risk TSD for an overview of the risk metrics used in the risk assessment)?

Question 3. Please comment on the benchmark used for identifying a potentially significant public health impact in the context of interpreting the IQ loss risk metric (i.e., an IQ loss of 1 to 2 points or more representing a potential public health hazard). Is

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[25] See http://yosemite.epa.gov/sab/sabpeople.nsf/WebCommittees/BOARD.

there any scientifically credible alternate decrement in IQ that should be considered as a benchmark to guide interpretation of the IQ risk estimates (*See* section 1.2 of the Mercury Risk TSD for additional detail on the benchmark used for interpreting the IQ loss estimates)?

Question 4: Please comment on the spatial scale used in defining watersheds that formed the basis for risk estimates generated for the analysis (i.e., use of 12-digit hydrologic unit code classification). To what extent do [Hydrologic Unit Code] HUC12 watersheds capture the appropriate level of spatial resolution in the relationship between changes in mercury deposition and changes in MeHg fish tissue levels? (see section 1.3 and Appendix A of the Mercury Risk TSD for additional detail on specifying the spatial scale of watersheds used in the analysis).

Question 5: Please comment on the extent to which the fish tissue data used as the basis for the risk assessment are appropriate and sufficient given the goals of the analysis. Please comment on the extent to which focusing on data from the period after 1999 increases confidence that the fish tissue data used are more likely to reflect more contemporaneous patterns of Hg deposition and less likely to reflect earlier patterns of Hg deposition. Are there any additional sources of fish tissue MeHg data that would be appropriate for inclusion in the risk assessment?

Question 6: Given the stated goal of estimating potential risks to highly exposed populations, please comment on the use of the 75th percentile fish tissue MeHg value (reflecting targeting of larger but not the largest fish for subsistence consumption) as the basis for estimating risk at each watershed. Are there scientifically credible alternatives to use of the 75th

percentile in representing potential population exposures at the watershed level?

Question 7: Please comment on the extent to which characterization of consumption rates and the potential location for fishing activity for high-end self-caught fish consuming populations modeled in the analysis are supported by the available study data cited in the Mercury Risk TSD. In addition, please comment on the extent to which consumption rates documented in Section 1.3 and in Appendix C of the Mercury Risk TSD provide appropriate representation of high-end fish consumption by the subsistence population scenarios used in modeling exposures and risk. Are there additional data on consumption behavior in subsistence populations active at inland freshwater water bodies within the continental U.S.?

Question 8: Please comment on the approach used in the risk assessment of assuming that a high-end fish consuming population could be active at a watershed if the "source population" for that fishing population is associated with that watershed (e.g., at least 25 individuals of that population are present in a U.S. Census tract intersecting that watershed). Please identify any additional alternative approaches for identifying the potential for population exposures in watersheds and the strengths and limitations associated with these alternative approaches (additional detail on how EPA assessed where specific high-consuming fisher populations might be active is provided in section 1.3 and Appendix C of the Mercury Risk TSD).

Question 9: Please comment on the draft risk assessment's characterization of the limitations and uncertainty associated with application of the Mercury Maps approach (including the assumption of propor-

tionality between changes in mercury deposition over watersheds and associated changes in fish tissue MeHg levels) in the risk assessment. Please comment on how the output of CMAQ [Community Multiscale Air Quality] modeling has been integrated into the analysis to estimate changes in fish tissue MeHg levels and in the exposures and risks associated with the EGU-related fish tissue MeHg fraction (e.g., matching of spatial and temporal resolution between CMAQ modeling and HUC12 watersheds). Given the national scale of the analysis, are there recommended alternatives to the Mercury Maps approach that could have been used to link modeled estimates of mercury deposition to monitored MeHg fish tissue levels for all the watersheds evaluated? (additional detail on the Mercury Maps approach and its application in the risk assessment is presented in section 1.3 and Appendix E of the Mercury Risk TSD).

Question 10: Please comment on the EPA's approach of excluding watersheds with significant non-air loadings of mercury as a method to reduce uncertainty associated with application of the Mercury Maps approach. Are there additional criteria that should be considered in including or excluding watersheds?

Question 11: Please comment on the specification of the concentration-response function used in modeling IQ loss. Please comment on whether EPA, as part of uncertainty characterization, should consider alternative concentration-response functions in addition to the model used in the risk assessment. Please comment on the extent to which available data and methods support a quantitative treatment of the potential masking effect of fish nutrients (e.g., omega-3 fatty acids and selenium) on the adverse neurological effects associated with mercury exposure, including

IQ loss (detail on the concentration-response function used in modeling IQ loss can be found in section 1.3 of the Mercury Risk TSD).

Question 12: Please comment on the degree to which key sources of uncertainty and variability associated with the risk assessment have been identified and the degree to which they are sufficiently characterized.

Question 13: Please comment on the draft Mercury Risk TSD's discussion of analytical results for each component of the analysis. For each of the components below, please comment on the extent to which EPA's observations are supported by the analytical results presented and whether there is a sufficient characterization of uncertainty, variability, and data limitations, taking into account the models and data used: Mercury deposition from U.S. EGUs, fish tissue MeHg concentrations, patterns of Hg deposition with HG fish tissue data, percentile risk estimates, and number and frequency of watersheds with populations potentially at risk due to U.S. EGU mercury emissions.

Question 14: Please comment on the degree to which the final summary of key observations in Section 2.8 is supported by the analytical results presented. In addition, please comment on the degree to which the level of confidence and precision in the overall analysis is sufficient to support use of the risk characterization framework described on page 18.

3. Summary of Peer Review Findings and Recommendations

The SAB was generally supportive of EPA's approach.[26] The SAB concluded, "[i]n summary, based on its review of the draft Technical Support Document

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[26] U.S. EPA-SAB, 2011.

and additional information provided by EPA representatives during the public meetings, the SAB supports the overall design of and approach to the risk assessment and finds that it should provide an objective, reasonable, and credible determination of the potential for a public health hazard from mercury emitted from U.S. EGUs."[27] The SAB further concluded, "[t]he SAB regards the design of the risk assessment as suitable for its intended purpose, to inform decision-making regarding an appropriate and necessary finding' for regulation of hazardous air pollutants from coal and oil-fired EGUs, provided that our recommendations are fully considered in the revision of the assessment." n28[28]

The SAB report contained many recommendations for improving the Hg Risk TSD, which the SAB organized into three general themes: (1) Improve the clarity of the Hg Risk TSD regarding methods and presentation of results, (2) expand the discussion of sources of variability and uncertainty, and (3) de-emphasize IQ loss as an endpoint. In the following subsection, we provide EPA's response to these recommendations.

4. The EPA's Responses to Peer Review Recommendations

In response to the peer review, the EPA has substantially revised the Hg Risk TSD. The revised Hg Risk TSD addresses all of the recommendations from the SAB and includes a detailed list of the specific revisions made to the Hg Risk TSD. Revisions in response to the main recommendations are

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[27] *Id.*

[28] *Id.*

summarized below. Italicized statements are the SAB's recommendations, which are followed by EPA's response.

- *The watershed-focus of the Hg Risk TSD should be clearly stated early in the introduction to the document.* We have stated clearly in the introduction to the revised Hg Risk TSD that the focus of the analysis is on scenarios of high fish consumption by subsistence level fishing populations, assessed at watersheds where there is the potential for such subsistence fishing activity. Specifically, we modeled risk for a set of subsistence fisher scenarios at those watersheds where (a) we have measured fish tissue Hg data and (b) it is reasonable to assume that subsistence-level fishing activity could occur. We emphasize the point that the analysis is not a representative population-weighted assessment of risk. Rather, it is based on evaluating these potential exposure scenarios.
- *Because IQ does not fully capture the range of neurodevelopmental effects associated with Hg exposure, analysis of this endpoint should be deemphasized (and moved to an appendix) and primary focus should be placed on the MeHg RfD-based hazard quotient metric. We modified the structure of the revised Hg Risk TSD accordingly.*
- *Clarify the rationale for using a Hazard Quotient (HQ) at or above 1.5 as the basis for selecting potentially impacted watersheds.* The SAB fully supported using HQ as the risk metric, but we revised the discussion in the Hg Risk TSD to clarify why we selected 1.5 as the benchmark. We clarified that exposures above the RfD (i.e., an HQ above one) represent increasing risk of neurological health

effects.[29] We further clarified that the HQ is calculated to only one significant digit, based on the precision in the underlying RfD calculations. As a result, rounding convention requires that any values at or above 1.5 be expressed as an HQ of 2, while any values below 1.5 (e.g., 1.49) be rounded to an HQ of 1. Thus, MeHg exposures leading to an HQ at or above 1.5 for pregnant women are considered above the RfD and are associated with increased risk of neurological health effects in children born to those mothers.

Regarding the fish tissue dataset used in the Hg Risk TSD, clarify which species of Hg is reflected in the underlying samples and discuss the implications of differences across states in sampling protocols in introducing bias into the analysis. We clarified that in most cases, the fish tissue is measured for total Hg. Furthermore, based on the scientific literature,[30] it is reasonable to assume that more than 90 percent of fish tissue Hg is MeHg. Therefore, we incorporated an Hg conversion factor[31] into our exposure calculations to account for the fraction of total Hg that is MeHg in fish. We also expanded the discussion of uncertainty to address the potential for different

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[29] As stated in the preamble to the proposal, based on the current literature, exposures above the RfD contribute to risk of adverse effects.

[30] See the literature summary in Chapter 4 of U.S. EPA. 2000. *Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories.* Office of Science and Technology, Office of Water, Washington, DC EPA 823-B-00-007.

[31] In the Hg Risk TSD accompanying the proposed rule, we assumed that 100 percent of Hg in fish was MeHg. We derived the 0.95 conversion factor for the revised Hg Risk TSD to reflect that most studies show that more than 90 percent of total Hg in fish is MeHg. See Chapter 4 of U.S. EPA, 2000.

sampling protocols across states to introduce bias into the Hg Risk TSD.

Additional detail should be provided on the characteristics of the fish tissue Hg dataset, including its derivation and the distribution of specific attributes across the dataset (e.g., number of fish tissue samples and number of different waterbodies in a watershed, number of species reflected across watersheds). We included additional figures and tables describing the derivation of the watershed-level fish tissue Hg dataset, including the filtering steps applied to the original water body level data and the additional steps taken to generate the watershed-level fish tissue Hg percentile estimates. In addition, we included tables summarizing key attributes of the dataset (e.g., distribution of fish tissue sample size and number of species across the watershed-level estimates).

Determine whether there is additional (more recent) fish tissue data for key states including Pennsylvania, New Jersey, Kentucky and Illinois where U.S. EGUs Hg deposition may be more significant. We expanded the fish tissue dataset by incorporating additional fish tissue data from the National Listing of Fish Advisories (NLFA), which included additional data for four states (MI, NJ, PA, and MN). We also obtained additional data for Wisconsin. These additional data expanded the number of watersheds in the analysis from 2,317 to 3,141, an increase of 36 percent. The additional watersheds improve coverage in areas with high levels of U.S. EGU-attributable Hg deposition, and thus increase our confidence in the overall results of the Hg Risk TSD.

Include additional discussion of the potential that the low sampling rates reflected across many of the

watersheds may low-bias the 75th percentile fish tissue Hg estimates used in estimating potential exposures. In addition, include a sensitivity analysis using the 50th percentile estimates to provide a bound on the risk. The SAB expressed support for the use of the 75th percentile fish tissue Hg value in the Hg Risk TSD, while recommending additional discussion of the issue. We provided additional description of the fish tissue dataset, including distribution of sample sizes and fish species across the watersheds, and an improved discussion of uncertainty and potential low bias resulting from estimation of the 75th percentile fish tissue levels. We also included a sensitivity analysis that used the 50th percentile watershed-level fish tissue Hg level. This sensitivity analysis showed that using the 50th percentile estimates resulted in a decrease in the number and percentage of modeled watersheds with populations potentially at-risk from U.S. EGU-attributable MeHg exposures, from 29 percent of watersheds exceeding either risk metric (i.e., MeHg exposure from U.S. EGUs alone exceeds the RfD or total MeHg exposure exceeds the RfD and U.S. EGUs contribute at least 5 percent) in the revised Hg Risk TSD to 26 percent in the sensitivity analysis in the revised Hg Risk TSD.

Expand the discussion of caveats associated with the fish consumption rates used in the analysis. The SAB was generally supportive of the consumption rates used, while recommending additional discussion of caveats. We expanded the discussion of uncertainty related to the fish consumption rates to address the caveats identified by the SAB. The uncertainty discussion now explains (1) that high-end consumption rates for South Carolina reflect small sample sizes, and therefore may be more uncertain, (2) that the consumption surveys underlying the studies are

older (i.e., mostly based on survey data from the 1990s) and behavior may have changed (i.e., consumption rates may have changed since the surveys were conducted), and (3) that consumption rates used in the Hg Risk TSD are annualized rather than seasonal rates and thus contribute little to overall uncertainty. None of these sources of uncertainty is associated with a particular directional bias (e.g., neither systematically higher nor lower risk).

Verify whether the consumption rates are daily values expressed as annual averages and whether they are "as caught" or "as prepared." We carefully reviewed the studies underlying the fish consumption rates used in the Hg Risk TSD and verified that the rates are annual averages of the daily consumption rates and that they represent as prepared estimates. We also expanded the explanation of the exposure calculations to describe more completely the exposure factors and equation used to generate the average daily MeHg intake estimates for the subsistence scenarios.

Explain the criteria for exclusion of fish less than 7 inches in length from analysis. We provided the rationale for the 7-inch cutoff for edible fish used in the Hg Risk TSD. Seven inches represents a minimum size limit for a number of key edible freshwater fish species established at the state level. For example, Pennsylvania establishes 7 inches as the minimum size limit for both trout and salmon (other edible fish species such as bass, walleye and northern pike have higher minimum size limits). The impact of the 7-inch cutoff is likely to be quite small, as only 6 percent of potential fish samples were excluded due to this criterion.

Identify the number of watersheds excluded from the analysis due to the criterion for excluding watersheds with less than 25 members of a source population. The SAB was generally supportive of the approach used for identifying watersheds with the potential for subsistence activity, while recommending additional information on the results of applying the approach. We added a figure to illustrate the number of watersheds with fish tissue Hg data used to model risk for each of the subsistence fishing scenarios. For all scenarios except the female subsistence fishing scenario, the exposure scenarios significantly limited the number of watersheds. Because the female subsistence fishing scenario does not differentiate with regard to ethnicity or socio-economic status (SES), we applied this scenario to all regions of the country and to all watersheds with fish tissue Hg data. This reflects our assumption that, given the generalized nature of the female subsistence fishing scenario, it is reasonable to assume that it could potentially occur at any watershed with fish tissue Hg data. The female subsistence fishing scenario included in the revised risk assessment is similar to the high-consuming female scenario included in the Hg Risk TSD.[32] However, the female subsistence fishing scenario is applied to all watersheds, while in the scenario for the high-consuming low-income female angler, we only evaluated watersheds with a population of at least 25 low-income females. The female subsistence fishing sce-nario provides greater coverage geographically than the high-consuming low-income female scenario. As described in the revised Hg Risk TSD, the EPA

[32] In the Revised Hg Risk TSD, this population is also referred to as the "typical female subsistence consumer."

made this change in response to SAB's concerns regarding the potential exclusion of watersheds with fewer than 25 individuals and regarding coverage for high-end recreational fish consumption.[33]

Enhance the discussion of the assumption of a linear relationship between changes in Hg deposition and changes in fish tissue Hg at the watershed level, including providing citations to more recent studies supporting the proportional relationship between changes in Hg deposition and changes in MeHg fish tissue levels. The SAB supported the assumption of a linear relationship between changes in Hg deposition and changes in fish tissue Hg at the watershed level, while recommending additional supporting language. We expanded our discussion of the scientific basis for the proportionality assumption and added citations for the more recent studies supporting the assumption. We also expanded the discussion of uncertainties associated with this assumption, including uncertainties related to the potential for sampled fish tissue Hg level to reflect previous Hg deposition, and the potential for non-air sources of Hg to contribute to sampled fish tissue Hg levels. Each of these sources of uncertainty may result in potential bias in the estimate of exposure associated with current deposition. If the fish tissue Hg levels are too high due to either previous Hg deposition or non-air sources of Hg, then the absolute level of exposure attributed to both total Hg deposition and U.S. EGU-attributable Hg deposition will be biased high. However, the percent

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[33] This change led to a very small increase in the number of watersheds with populations potentially at-risk. In the Hg Risk TSD accompanying the proposed rule, approximately 4 percent of modeled watersheds were excluded based on the SES-based filtering criteria.

contribution from U.S. EGUs will not be affected as it depends entirely on deposition. The EPA took steps to minimize the potential for these biases by (1) only using fish tissue Hg samples from after 1999, and (2) screening out watersheds that either contained active gold mines or had other substantial non-U.S. EGU anthropogenic emissions of Hg. The SAB concluded that the EPA's approach to minimizing the potential for these biases to affect the results of the Hg Risk TSD is sound. In addition, we conducted several sensitivity analyses to gauge the impact of excluding watersheds with the potential for non-EGU Hg loading. We found that the estimates of the percent of modeled watersheds with populations potentially at-risk were largely insensitive to these exclusions, suggesting that any potential biases from including watersheds with potential non-air Hg loadings are likely to be small.

Additional sources of variability should be discussed in terms of the degree to which they are reflected in the design of the risk assessment and the impact that they might have on risk estimates. These include: (1) The geographic patterns of populations of subsistence fishers, including how this factor interacts with the limited coverage we have for watersheds with our fish tissue Hg data, (2) the protocols used by states in collecting fish tissue Hg data, (3) body weights for subsistence fishing populations and the impact that this might have on exposure estimates, and (4) preparation and cooking methods which affect the conversion of fish tissue Hg levels (as measured) into "as consumed" values. We expanded the discussion of sources of variability in the revised Hg Risk TSD to more fully address these sources of variability. The Hg Risk TSD quantitatively reflected many aspects of variability, including spatial and temporal variability

in Hg emissions, Hg deposition, fish tissue Hg levels, and subsistence behavior. After evaluating the aspects of variability assessed qualitatively in the Hg Risk TSD such as temporal response in fish tissue, we do not be-lieve that quantitatively incorporating any of these aspects would substantially change the risk results given the stated goal of the analysis to identify watersheds where potential exposures to MeHg from self-caught fish consumption could exceed the RfD.

Additional sources of uncertainty should be discussed in terms of their potential impact on risk estimates. These include: (1) Emissions inventory used in projecting total and U.S. EGU-attributable Hg deposition, including the pro-jection of reductions in U.S. EGU emissions for the 2016 scenario, (2) air quality modeling with CMAQ including the prediction of future air quality scenarios, (3) ability of the Mercury Maps-based approach for relating Hg deposition to MeHg in fish to capture Hg hotspots, (4) the limited coverage that we have with fish tissue Hg data for watersheds in the U.S. and implications for the Hg Risk TSD, (5) the preparation factor used to estimate "as consumed" fish tissue Hg levels, (6) the proportionality assumption used to relate changes in Hg deposition to changes in fish tissue Hg levels at the watershed-level, (7) characterization of the spatial location of subsistence fisher populations (including the degree to which these provide coverage for high-consuming recreational fishers), and (8) application of the RfD to low SES populations and concerns that this could low-bias the risk estimates. We expanded the discussion of sources of uncertainty presented in the revised TSD to address more fully these sources of uncertainty and the potential impact on risk estimates. Regarding these eight additional sources of uncertainty, we have (1) evaluated the uncertainties

in the emissions and determined that while an important source of uncertainty, we are not able to quantify emissions uncer-tainty in the risk analysis, but have determined that the emissions inventories and emissions models represent the best available methods for predicting Hg emissions in the U.S., (2) evaluated the uncertainties in the Hg deposition predic-tions and determined that while an important source of uncertainty, we are not able to quantify uncertainty in Hg deposition in the Hg Risk TSD. Moreover, the CMAQ model used to estimate deposition is based on peer reviewed science and represents the best available method for predicting Hg deposition in the U.S., (3) evaluated the ability of the Mercury Maps-based approach for relating Hg deposition to MeHg in fish to capture Hg hotspots and determined that while finer resolution deposition modeling might reveal additional areas with elevated deposition, the 12 kilometer (km) deposition modeling matches well with the watershed size selected for the analysis, and thus the use of 12 km deposition estimates with the Mercury Maps based approach will not be a large source of uncertainty, (4) evaluated the limited coverage that we have with fish tissue Hg data for watersheds in the U.S. and implications for the Hg Risk TSD and based on the SAB's recommendations, we supplemented the coverage of watersheds by obtaining addi-tional fish tissue Hg samples for areas heavily impacted by U.S. EGU deposition, thus reducing the uncertainty in the analysis, (5) evaluated the uncertainty in the preparation factor and determined that the level of uncertainty is low, and as such would have minimal impact on the risk estimates, (6) evaluated the uncertainty resulting from the proportion-ality assumption used to relate changes in Hg deposition to

changes in fish tissue Hg levels at the watershed-level, and determined, based both on quantitative sensitivity analyses and qualitative assessments, that this source of uncertainty is not likely to greatly influence the results, and is not likely to have a specific directional bias, (7) evaluated the uncer-tainty related to characterization of the spatial locations of subsistence populations and determined that uncertainty could be reduced by focusing the risk estimates on female subsistence fishing populations, which are assumed to have the potential to fish in all watersheds, in response to SAB's concerns regarding potential exclusion of watersheds with fewer than 25 individuals and (8) evaluated the potential impact of the uncertainty in application of the RfD to low SES populations. The EPA determined that due to the method used in calculating the RfD, we have confidence that the RfD provides protection for low SES populations.

Expand the sensitivity analyses (over those included in the original risk assessment) to address uncertainty related to the use of the 75th percentile fish tissue Hg value (at each watershed) as the core risk estimate. Based on the SAB's recommendation, we added a sensitivity analysis using the median fish tissue Hg estimate (at the watershed level). This sensitivity analysis showed that use of the median fish tissue Hg concentration instead of the 75th percentile resulted in a relatively small decrease (*i.e.*, 10 percent) in the estimates of watersheds with populations potentially at-risk, and did not substantially change the conclusions of the risk assessment.

C. *Summary of Results of Revised Hg Risk TSD of Risks to Populations With High Levels of Self-Caught Fish Consumption*

Based on the recommendations we received from the SAB, we revised the quantitative analysis of risk to subsistence fishing populations with high levels of fish consumption. Our revision to the quantitative risk results reflects three key recommendations from the SAB, including (1) addition of 824 watersheds based on additional fish tissue Hg sample data we obtained from states and the National Listing of Fish Advisories, (2) application of a 0.95 adjustment factor to the reported fish tissue Hg concentrations to account for the fraction that is MeHg, and (3) inclusion of all watersheds with fish samples that meet the filtering criteria[34] in representing potential exposures associated with increased risk of neurologic health effects for female subsistence fishing populations.

Based on these revisions, our estimates of the number and percent of modeled watersheds with populations potentially at-risk from exposure to EGU-attributable MeHg changed from those presented in the preamble to the proposed rule.[35] For the

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[34] The watersheds were filtered to exclude watersheds that: (a) Were not freshwater, (b) did not have fish sampling data since 2000, (c) did not have fish larger than 7 inches in length, (d) contained active gold mines or (e) had substantial non-air Hg loading.

[35] Since the time of the analyses conducted in support of the proposed rule, the EPA updated IPM modeling to reflect the most recently available information, including public comments and the final CSAPR (see IPM Documentation for further details n35n35on these updates, which is available in the docket). Compared to the modeling conducted at proposal, these updates are projected to result in greater reductions in criteria pollutants, and also to have a slightly greater impact on U.S. EGU Hg

99th percentile consumption scenario, the number of watersheds with fish tissue Hg samples where subsistence fishing populations may be at-risk from exposure to EGU-attributable MeHg increased from 672 to 917 (an increase of 36 percent). For this same scenario, the total percent of modeled watersheds with populations potentially at-risk from either risk metric (*i.e.*, MeHg exposure from U.S. EGUs alone exceeds the RfD or total MeHg exposure exceeds the RfD and U.S. EGUs contribute at least 5 percent) increased from 28 percent estimated at proposal to 29 percent after addressing SAB recommendations. The increase in the total percent of modeled watersheds with populations potentially at-risk using the expanded geographic coverage of watersheds provides additional confidence that emissions of Hg from U.S. EGUs pose a hazard to public health. For the 99th percentile consumption scenario, the percent of modeled watersheds with populations potentially at-risk from total potential exposures to MeHg that exceed the RfD and U.S. EGUs contribute at least 5 percent increased from 22 percent to 24 percent. For the 99th percentile consumption scenario, the percent of modeled watersheds with populations potentially at-risk based on Hg deposition from U.S. EGUs alone decreased from 12 percent to 10 percent.

The additional sensitivity analyses conducted in response to the SAB peer review showed that the estimates of the percent of modeled watersheds

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emissions. Based on the revised projection for 2016, the EPA estimates that U.S. EGUs would emit 27 tons of Hg, as compared to the 29 tons we modeled for the Hg Risk TSD. We do not expect this 2 ton difference to substantially change the mercury risks reported in the preamble to the proposed rule, as this represents less than a 10 percent reduction in Hg emissions.

with populations potentially at-risk are robust to alternative assumptions about both the watersheds included in the analysis and the selection of the 50th percentile or 75th percentile fish tissue Hg level. Sensitivity analyses excluding entire states with the potential for historical loadings of Hg from non-air sources[36] resulted in an increase from 29 percent to 33 percent in the total percent of modeled watersheds with populations potentially at-risk exceeding either risk metric (*i.e.*, U.S. EGUs alone or total potential exposures to MeHg exceed the RfD and U.S. EGUs contribute at least 5 percent). Including only watersheds in the top 25th percentile of U.S. EGU deposition resulted in an increase in the total percent of modeled watersheds with populations potentially at-risk exceeding either risk metric, from 29 percent to 30 percent. Using the 50th percentile fish tissue Hg level resulted in a decrease in the total percent of modeled watersheds with populations potentially at-risk exceeding either risk metric, from 29 percent to 26 percent. On balance, these sensitivity analyses do not substantially reduce the percent of modeled watersheds with populations potentially at-risk, and thus confirm the finding that Hg emissions from U.S. EGUs pose a hazard to public health. In fact, given the broader coverage of modeled watersheds in the revised analysis, we have even greater confidence in our finding that Hg emissions from U.S. EGUs pose a hazard to public health.

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[36] The SAB noted that areas with substantially elevated fish tissue Hg levels could also be characterized by lakes and rivers with high natural methylation rates, and thus some of the states we excluded for this sensitivity analysis might not have fish tissue Hg levels that reflect non-U.S. EGU Hg loadings.

D. Peer Review of the Approach for Estimating Cancer Risks Associated With Cr and Ni Emissions in the U.S. EGU Case Studies of Cancer and Non-Cancer Inhalation Risks for Non-Hg HAP and EPA Response

As explained in the preamble to the proposed rule, the EPA submitted for peer review its characterization of the chemical speciation for the emissions of Cr and Ni used in the non-Hg HAP inhalation risk case studies. The remaining aspects of the non-Hg HAP case study risk assessments used methods that were previously peer reviewed. Specifically, the methodologies used to conduct the non-Hg case studies are consistent with those used to conduct inhalation risk assessments under EPA's Risk and Technology Review (RTR) program. Because the RTR assessments are considered to be highly influential science assessments, the methodologies used to conduct them were subject to a peer review by the SAB in 2009. The SAB issued its peer review report in May 2010.[37] The report endorsed the risk assessment methodologies used in the program, and made a number of technical recommendations for EPA to consider as the RTR program evolves.

The EPA's case studies identified Cr and Ni emissions as the key drivers of the estimated inhal-

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[37] U.S. Environmental Protection Agency—Science Advisory Board (U.S. EPA-SAB). 2010. *Review of EPA's draft entitled, "Risk and Technology Review (RTR) Risk Assessment Methodologies: For Review by the EPA's Science Advisory Board with Case Studies—MACT I Petroleum Refining Sources and Portland Cement Manufacturing". EPA-SAB-10-007. May. Available on-line at: http://yosemite.epa.gov/sab/sabproduct.nsf/4AB3966E263D943A8525771F00668381/$File/EPA-SAB-10-007-unsigned.pdf.*

ation cancer risks for EGUs. Because these results hinged on specific scientific interpretations of data used to characterize EGU emissions of Cr and Ni, the EPA conducted a letter peer review of its analysis and interpretation of those data relative to the quantification of inhalation risks associated with Cr and Ni emissions from U.S. EGUs. The following sections describe the peer review process, enumerate the peer review charge questions presented to the peer review panel, summarize the key recommendations from the peer review, and summarize our responses to those recommendations.

1. Summary of Peer Review Process

The EPA asked three independent, external peer reviewers representing government, academic and the private sector to review of the methods for developing inhalation cancer risk estimates associated with emissions of Cr and Ni compounds from coal- and oil-fired EGUs in support of the appropriate and necessary finding. The approaches and rationale for the technical and scientific considerations used to derive inhalation cancer risks were summarized in the draft document entitled, "Methods to Develop Inhalation Cancer Risk Estimates for Chromium and Nickel Compounds." The peer reviewers received several charge questions (three questions on Cr and two questions on Ni, which are provided below) on the technical and scientific relevance of the approaches used to develop the inhalation unit risk estimates. The EPA also provided information on Cr speciation profiles for different industrial sources, as well as information on the Ni speciation of PM from oil-fired EGUs.

2. Peer Review Charge Questions

Below, we present the charge questions posed to the peer reviewers to help guide their review and development of recommendations to EPA on key issues relevant to the characterization of risks from EGU emissions containing either Cr or Ni compounds.

The EPA asked three questions regarding Cr and Cr compounds:

Question 1: Do EPA's judgments related to speciated Cr emissions adequately take into account the available Cr speciation data?

Question 2: Has EPA selected the species of Cr (*i.e.*, hexavalent Cr, Cr(VI)) that accurately represents the toxicity of Cr and Cr compounds?

Question 3: Are the assumptions used in past analysis scientifically defensible, and are there alternatives that EPA should consider for future analysis?

The EPA asked two questions regarding Ni and Ni compounds:

Question 1: Do EPA's judgments related to speciated Ni emissions adequately take into account available speciation data, including recent industry spectrometry studies?

Question 2: Based on the speciation information available and on what we know about the health effects of Ni and Ni compounds, and taking into account the existing Unit Risk Estimates (URE) values (*i.e.*, values derived for EPA's Integrated Risk Information System (IRIS), California Environmental Protection Agency (Cal EPA) and Texas Commission on Environmental Quality (TCEQ)), the EPA has

provided several approaches[38] to derive unit risk estimates that may be more scientifically defensible than those used in past analyses. Which of the options presented would result in more accurate and defensible characterization of risks from exposure to Ni and Ni compounds? Are there alternative approaches that EPA should consider?

3. Summary of Peer Review Findings and Recommendations

Regarding Cr and Cr compounds, all three reviewers considered Cr(VI) as the species likely to be driving cancer risks based on solid evidence from the health effects database for Cr and Cr compounds. All three authors also considered EPA's use of the average of the range of the available speciation data (*i.e.*, 12 percent and 18 percent Cr(VI) contained in coal- and oil-fired EGUs, respectively) as a reasonable approach for the derivation of default speciation profiles to be used when there is no speciation data available. All reviewers agreed that there is high uncertainty associated with the variability in the speciation data available for Cr (*e.g.*, range of approximately 4 to 23 percent Cr(VI) from coal-fired units). One of the reviewers recommended several additional studies for EPA's consideration; the EPA considered these in finalizing the report.

Regarding Ni and Ni compounds, the reviewers agreed with the views of the international scientific bodies, which consider Ni compounds carcinogenic as a group. One reviewer recommended that the EPA

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[38] See section 3.3 of U.S. Environmental Protection Agency (U.S. EPA). 2011c. *Methods to Develop Inhalation Cancer Risk Estimates for Chromium and Nickel Compounds.* Office of Air Quality Planning and Standards. October.

review several additional Ni speciation data that suggests that sulfidic Ni compounds (which the reviewer considered as the most potent carcinogens within the group of all Ni compounds) are present at low levels in emissions from EGUs. In addition, this reviewer pointed out that there is a recently proposed model that may explain the differences in carcinogenic potential across Ni compounds.

4. The EPA's Responses to Peer Review Recommendations

We summarize EPA's basic responses to the peer review comments below, first for Cr-related issues, and second for Ni-related issues, which are reflected in the revised document.[39]

a. Cr and Cr Compounds

In agreement with the peer reviewers and based on the health effects information available for Cr, the EPA assigns high confidence in the assumption that Cr(VI) is the carcinogenic species driving the risk of Cr-emitting facilities. In agreement with the reviews, the EPA considers derivation of default speciation profiles based on the mass of Cr(VI) a reasonable approach. As suggested by one of the reviewers, the EPA reviewed two potentially relevant studies, one of which showed coal combustion emissions containing as much as 43 percent Cr(VI),[40] which suggests that the EPA's quantitative approach could actually underestimate Cr(VI) inhalation risks. However, the other study reviewed by EPA on speciation of Cr in

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[39] U.S. EPA, 2011c.

[40] Galbreath KC, Zygarlicke CJ. 2004. "Formation and chemical speciation of arsenic-, chromium-, and nickel-bearing coal combustion $PM_{2.5}$," *Fuel Process Technol* 85:701-726.

coal combustion showed Cr(VI) percentage levels close to detection limits (*i.e.*, 3 to 5 percent of total Cr, which was close to the limit of detection in this study).[41] Thus, the more recent speciation data available is unlikely to reduce the uncertainty of the Cr speciation analyses used by EPA as the bases for risk characterization analysis.

In agreement with the peer reviewers, the EPA also recognizes that the confidence in the default speciation profiles is low because the profiles are based on a limited data set with a wide range of percentages of Cr(VI) across the different samples.

b. Ni and Ni Compounds

Based on the views of the major scientific bodies mentioned above and the peer reviewers that commented on EPA's approaches to risk characterization of Ni compounds, the EPA considers all Ni compounds to be carcinogenic as a group and the EPA does not consider Ni speciation or Ni solubility to be strong determinants of Ni carcinogenicity. These scientific bodies also recognize that based on the data available, the precise Ni compound(s) responsible for the carcinogenic effects in humans is not always clear, and that there may be differences in the potential toxicity and carcinogenic potential across Ni compounds. Nevertheless, studies in humans indicate that various mixtures of Ni compounds (including Ni sulfate, sulfides and oxides, alone or in combination) encountered in the Ni refining industries may cause cancer in humans, and there is no reason to expect anything different from this for mixtures of Ni compounds from

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[41] Huggins FE, Najih M, Huffman GP. 1999. "Direct speciation of chromium in coal combustion by-products by X-ray absorption fine structure spectroscopy," *Fuel Process Techno* l 78:233-242.

other emission sources. One of the reviewers suggested we consider views by some authors that believe that water soluble Ni, such as Ni sulfate, should not be considered a human carcinogen. This view is based primarily on a negative Ni sulfate 2-year rodent bioassay by the National Toxicology Program (NTP) (which is different from the positive 2-year NTP bioassay for Ni subsulfide). [42] [43] [44] One review article identifies the discrepancies between the animal and human data (*i.e.*, from studies of cancers in workers inhaling certain forms of Ni versus inhalation studies suggesting different carcinogenic potential in rodents with different Ni compounds) and states that the epidemiological data available clearly support an association between Ni and increased cancer risk, although the article acknowledges that the data are weakest regarding water soluble Ni. In addition, the EPA identified a recent review[45] that highlights the robustness and consistency of the epidemiological evidence across several decades showing associations

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[42] Oller A. 2002. "Respiratory carcinogenicity assessment of soluble nickel compounds." *Environ Health Perspect.* 110:841-844.

[43] Heller JG, Thornhill PG, Conard BR. 2009. "New views on the hypothesis of respiratory cancer risk from soluble nickel exposure; and reconsideration of this risk's historical sources in nickel refineries." *J Occup Med Toxicol.* 4:23.

[44] Goodman JE, Prueitt RL, Thakali S, and Oller AR. 2011. "The nickel iron bioavailability model of the carcinogenic potential of nickel-containing substances in the lung." *Crit Rev Toxicol* 41:142-174.

[45] Grimsrud TK and Andersen A. "Evidence of carcinogenicity in humans of water-soluble nickel salts." *J Occup Med Toxicol.* 2010. 5:1-7. Available online at *http://www.ossup-med.com/content/5/1/7.*

between exposure to Ni and Ni compounds (including Ni sulfate) and cancer.

Regarding the second charge question on Ni compounds, two reviewers suggested using the URE derived by the TCEQ[46] for all Ni compounds as a group, rather than the one derived by the Integrated Risk Information System (IRIS, 1991)[47] specifically for Ni subsulfide. The third reviewer did not comment on an alternative approach. Considering this, to develop our primary risk estimate, the EPA decided to use a health protective approach by applying 100 percent of the current IRIS URE for Ni subsulfide, rather than assuming that 65 percent of the total mass of emitted Ni might be Ni subsulfide, as used in previous analyses. We used the IRIS URE value because IRIS values are preferred given the conceptual consistency with EPA risk assessment guidelines and the level of peer review that such values receive. We used 100 percent of the IRIS value because of the concerns about the potential carcinogenicity of all forms of Ni raised by the major national and international scientific bodies, and recommendations of the peer reviewers. Nevertheless, taking into account that there are potential differences in toxicity and/or carcinogenic potential across the different Ni compounds, and given that two URE values have been derived for exposure to mixtures of Ni compounds that

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[46] Texas Commission on Environmental Quality (TCEQ). 2011. *Development Support Document for nickel and inorganic nickel compounds.* Available online at *http://www.tceq.state.tx.us/assets/public/implementation/tox/dsd/final/june11/nickel_&_compounds.pdf.*

[47] U.S. EPA, 1991. *Integrated Risk Information Service (IRIS) assessment for nickel subsulfide.* Available at: *http://www.epa.gov/iris/subst/0273.htm.*

are two to three fold lower than the IRIS URE for Ni subsulfide, the EPA also considers it reasonable to use a value that is 50 percent of the IRIS URE for Ni subsulfide for providing an estimate of the lower end of a plausible range of cancer potency values for different mixtures of Ni compounds.

Although this report focused primarily on cancer risks associated with emissions containing Ni compounds, it is important to note that comparative quantitative analyses of non-cancer toxicity of Ni compounds indicate that Ni sulfate is as toxic or more toxic than Ni subsulfide or Ni oxide which does not support the notion that the solubility of Ni compounds is a strong determinant of its toxicity.[48] [49]

E. Summary of Results of Revised U.S. EGU Case Studies of Cancer and Non-Cancer Inhalation Risks for Non-Hg HAP

Based on the results of the peer review and public comments on the non-Hg case study chronic inhalation risk assessment, we made several changes to the emissions estimates, dispersion modeling, and risk characterization for the modeled case study facilities. Key changes include (1) changes in emissions, (2) changes in stack parameters for some facilities based on new data received during the public comment period, (3) use of updated versions of AERMOD and

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[48] Haber LT, Allen BC, Kimmel CA. 1998. "Non-Cancer Risk Assessment for Nickel Compounds: Issues Associated with Dose-Response Modeling of Inhalation and Oral Exposures." *Toxicol Sci.* 43:213-229.

[49] National Toxicology Program (NTP). 1996. *Technical Report Series No. 454, Toxicology and carcinogenesis studies of nickel sulfate hexahydrate.* July. Available online at *http://ntp.niehs.nih.gov/ntp/htdocs/LT_rpts/tr454.pdf.*

its input processors (AERMAP, AERMINUTE, and AERMET), and (4) use of 100 percent of the current IRIS URE for Ni subsulfide to calculate Ni-associated inhalation cancer risks (rather than assuming that the Ni might be 65 percent as potent as Ni subsulfide).

Based on estimated actual emissions, the highest estimated individual lifetime cancer risk from any of the 16 case study facilities was 20 in a million, driven by Ni emissions from the one case study facility with oil-fired EGUs. Of the facilities with coal-fired EGUs, five facilities had maximum individual cancer risks greater than one in a million[50] (the highest was five in a million), with the risk from four due to emissions of Cr(VI) and the risk from one due to emissions of Ni.[51] There were also two facilities with coal-fired EGUs that had maximum individual cancer risks equal to one in a million. All of the facilities had non-cancer Target Organ Specific Hazard Index (TOSHI)[52] values less than one, with a maximum TOSHI value of

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[50] A risk level of 1 in a million implies a likelihood that up to one person, out of one million equally exposed people would contract cancer if exposed continuously (24 hours per day) to the specific concentration over 70 years (an assumed lifetime). This would be in addition to those cancer cases that would normally occur in an unexposed population of one million people.

[51] When the lower end of the cancer potency range for Ni was used to develop risk estimates, 5 of the 16 facilities had maximum cancer risks exceeding 1 in a million, and the maximum individual cancer risk for any single facility fell to 10 in a million.

[52] The target-organ-specific hazard index (TOSHI) is a metric used to assess whether there is an appreciable risk of deleterious (noncancer) effects to a specific target organ due to continuous inhalation exposures over a lifetime. If a TOSHI value is less than or equal to one, such effects are unlikely. For TOSHI values greater than one, there is an increased risk of such effects.

0.4 (also driven by Ni emissions from the one case study facility with oil-fired EGUs).

Since these case studies do not cover all facilities in the category, and since our assessment does not include the potential for impacts from different EGU facilities to overlap one another (*i.e.*, these case studies only look at facilities in isolation), the maximum risk estimates from the case studies likely underestimates true maximum risks for the source category.

Based on the fact that six U.S. EGUs were estimated to meet or exceed the CAA section 112(c)(9) criterion of one in a million, EGUs cannot be removed from the list of source categories to be regulated under CAA section 112.

F. Public Comments and Responses to the Appropriate and Necessary Finding

1. Legal Aspects of Appropriate and Necessary Finding

a. History of Section 112(n)(1)(A)

Comment: One commenter provided a detailed history of EPA's regulatory actions concerning EGUs and implementation of CAA section 112(n)(1)(A). The same commenter implies that the EPA's 2000 appropriate and necessary finding and listing of EGUs was flawed because the Agency did not comply with CAA section 307(d) rulemaking process. The commenter sought review of the 2000 notice in the U.S. Court of Appeals for the District of Columbia Circuit, which was dismissed by the D.C. Circuit. *Utility Air Regulatory Group* v. *EPA,* No. 01-1074 (D.C. Cir. July 26, 2001). The commenter then characterizes at length the 2005 EPA action that revised the interpretation of CAA section 112(n)(1)(A) and, which the D.C. Circuit

concluded illegally removed EGUs from the CAA section 112(c) list of sources that must be regulated under CAA section 112. *See New Jersey v. EPA, 517 F.3d 574 (D.C. Cir. 2008).* The commenter notes that the D.C. Circuit did not rule on the legal correctness or the sufficiency of the factual record supporting EPA's 2000 listing decision or on the factual correctness of EPA's later decision to reverse its CAA section 112(n)(1)(A) determination. The commenter noted further that the D.C. Circuit indicated that the listing decision could be challenged when the Agency issued the final CAA section 112(d) standards pursuant to CAA section 112(e)(4). The commenter concluded by asserting that the Agency could not ignore the history associated with the regulation of EGUs under section 112 and that two earlier dockets—Docket ID. No. A-92-55 and Docket ID. No. EPA-HQ-OAR-2002-0056—are also part of this long rulemaking effort and must be accounted for in conjunction with Docket No. EPA-HQ-OAR-2009-0234 if all pertinent material and comments are to be part of the rulemaking record.

Response: The commenter characterizes the regulatory history of the rule EPA proposed on May 3, 2011. To the extent that characterization is inconsistent with the lengthy regulatory history EPA provided in the preamble to the May 3, 2011 rule, we disagree. We address several of the statements in more detail below.

First, the commenter makes much of the fact that the EPA did not go through CAA section 307(d) notice and comment rulemaking when making the appropriate and necessary finding and listing decision in 2000. However, the commenter's complaint is without foundation. The CAA does not require CAA section 307(d) rulemaking for listing decisions. In fact,

CAA section 112(e)(4) specifically provides that listing decisions may only be challenged "when the Administrator issues emission standards for such * * * [listed] category." Second, the commenter challenged the listing decision in the U.S. Court of Appeals for the District of Columbia Circuit (Court) and, on July 26, 2001, the Court granted EPA's motion to dismiss that action based on the plain language of CAA section 112(e)(4). Moreover, in addition to the 2000 notice, the EPA clearly articulated its basis for listing EGUs in this proposed rule, which is consistent with CAA section 307(d), and the commenter was provided an ample opportunity to comment. Finally, the commenter asserts that the rulemaking docket for this action is incomplete because the Agency did not include two earlier dockets—Docket ID. No. A-92-55 and Docket ID. No. EPA-HQ-OAR-2002-0056—for the Section 112(n) Revision Rule, *70 FR 15994* (March 29, 2005), and the reconsideration of the Section 112(n) Revision Rule, *71 FR 33388* (June 9, 2006), respectively. The commenter is incorrect because EPA incorporated by reference the two dockets at issue. *See* EPA-HQ-OAR-2009-0234-3056.

Comment: One commenter stated that the EPA has assessed the public health risks posed by HAP emissions from coal- and oil-fired EGUs for the last 40 years. According to the commenter, throughout that time, the EPA has come to a single repeated conclusion that HAP emissions from EGUs pose little or no risk to public health. Based on this conclusion, the EPA has properly chosen not to require EGUs to install expensive, new pollution control equipment to control HAP emissions. The commenter asserts that, in this proposed rule, the EPA shifts its opinion on the health impacts of EGU HAP emissions 180 degrees and now seeks to impose sweeping regulatory requirements on

all power plants. According to the commenter, the EPA's newfound concern about HAP emissions from EGUs is not based on new and different assessments of the public health consequences of EGU HAP emissions but instead on health benefits from the reduction of non-hazardous air pollutants, primarily PM, which the Agency is required to regulate under other provisions of the CAA. One commenter stated that for decades, the EPA set primary ambient air quality standards that protect public health with an adequate margin of safety, CAA section 109(b)(1), and set secondary standards that are [sic] "requisite to protect the public welfare from any known or anticipated adverse effects associated with the presence of such air pollutant in the ambient air," CAA 109(b)(2). The commenter notes that even if EPA now views those past PM standards as inadequate, the EPA has ongoing regulatory proceedings in which it can address any perceived health concerns. The commenter concludes that regulation of EGU HAP emissions under CAA section 112 is an unlawful way to address those concerns.

Response: The commenter is incorrect in its assertion that the Agency has consistently concluded that HAP emissions from EGUs do not present a hazard to public health. In the 2000 finding, the Agency concluded that HAP emissions from coal- and oil-fired EGUs do pose a hazard to public health and determined that it was appropriate and necessary to regulate such units under CAA section 112. As a result of that finding, the EPA added coal- and oil-fired EGUs to the CAA section 112(c) list of source categories for which emission standards are to be established pursuant to CAA section 112(d). Further, in support of the proposed rule, the EPA conducted additional extensive quantitative and qualitative

analyses, which confirm that it remains appropriate and necessary to regulate EGUs under CAA section 112. Among other things, those analyses demonstrate that emissions from coal- and oil-fired EGUs continue to pose a hazard to public health. The commenter also fails to note that the EPA found that HAP emissions from EGUs pose a hazard to the environment as well.

The commenter seems confused about the basis for the Agency's appropriate and necessary finding because it maintains that the EPA made the appropriate and necessary finding based on the health co-benefits attributable to PM reductions that will be achieved as a result of the Agency's regulation of HAP emissions from EGUs. Nowhere in the May 2011 proposal does EPA state that it based the appropriate and necessary finding on hazards to public health attributable to PM emissions. The commenter's allegation lacks foundation. The appropriate and necessary finding unmistakably focuses on the hazards to public health and hazards to the environment associated with HAP emissions from EGUs.

Comment: One commenter stated that CAA section 112 required EPA to make a risk-based determination in order to regulate HAP. According to the commenter, the EPA may regulate substances "reasonably * * * anticipated to result in an increase in mortality or increase in serious illness" to a level that protects public health with an "ample margin of safety." According to the commenter, the EPA has regulated a number of HAP emitted from industrial source categories other than EGUs.

As for EGUs, according to the commenter, the EPA found that the combustion of fossil fuels produces extremely small emissions of a broad variety of substances that are present in trace amounts in fuels and

that are removed from the gas stream by control equipment installed to satisfy other CAA requirements. The commenter stated that the EPA, in past reviews, found that these HAP emissions did not pose hazards to public health. *See 48 FR 15076, 15085 (1983)* (radionuclides). the commenter further stated that "[i]n the case of Hg specifically, the EPA found that "coal-fired power plants * * * do not emit mercury in such quantities that they are likely to cause ambient mercury concentration to exceed" a level that "will protect public health with an ample margin of safety." *40 FR 48297-98* (October 19, 1975) (Hg); *52 FR 8724, 8725* (March. 19, 1987) (reaffirming Hg conclusion).

According to the commenter, in the late 1980s, the EPA was concerned that its prior risk assessments of individual HAP emissions from fossil-fuel-fired power plants may not reflect the total risks posed by all HAP emitted by those sources. The commenter states that the EPA modeled the risks posed by all HAP emitted by power plants (very much like the analyses the Agency would conduct for the Utility Study ten years later). The commenter asserts that the modeling again failed to identify threats to public health that warranted regulation under an "ample margin of safety" test.

Response: The commenter's statements concerning the pre-1990 CAA are not relevant to the current action. Congress enacted CAA section 112(n)(1) as part of the 1990 amendments to the Act. That provision requires, among other things, that the Agency evaluate the hazards to public health posed by HAP emissions from fossil-fuel fired EGUs. Had Congress concluded, as commenter appears to assert, that HAP emissions from EGUs did not pose a hazard to public health or the environment, it defies reason

that Congress would have required EPA to conduct the three studies at issue in CAA section 112(n)(1) (titled "Electric utility steam generating units") and regulate EGUs under section 112 if the Administrator determined in her discretion that it was appropriate and necessary to do so. The Agency complied with the statutory mandates in CAA section 112(n)(1) in conducting the studies and reasonably exercised its discretion in making the appropriate and necessary finding.

We acknowledge that Congress treated radionuclide emissions from EGUs differently. For radionuclides from EGUs (and certain other sources), Congress included CAA section 112(q)(3), which authorizes but does not require the Agency to maintain the regulations of radionuclides in effect prior to the 1990 amendments. The fact that Congress made an exception for radionuclides and no other HAP from EGUs further demonstrates that the HAP-related actions EPA took with regard to EGUs prior to the 1990 amendments to the CAA are not germane.

As for the commenter's statements about Hg emissions from EGUs, we find their conclusions wholly inconsistent with CAA section 112(n)(1). That provision is titled "Electric utility steam generating units," and it directs EPA to conduct two Hg-specific studies. *See* CAA sections 112(n)(1)(B) and 112(n)(1)(C). The commenter's suggestion that the EPA could or should rely on assessments of Hg from EGUs conducted prior to the 1990 amendments is not tenable.

Finally, the commenter stated that the EPA conducted a risk assessment of all HAP from EGUs prior to the 1990 amendments and that the Agency did not identify any HAP that failed the "ample margin of

safety" test. The commenter did not cite the study or provide any information to support the statements so we are unable to respond to the alleged study directly; however, the risk assessments conducted in support of the appropriate and necessary finding, as well as the 2000 finding, demonstrate that HAP emissions from EGUs pose hazards to public health and the environment.

b. Interpretation of "Appropriate" and "Necessary"

Comment: One commenter stated that in the preamble to the proposed rule, the EPA sets out its "interpretation of the critical terms in CAA section 112(n)(1)," arguing that this latest interpretation is "wholly consistent with the CAA" and with the Agency's earlier "2000 finding." *See 76 FR 24976, 24986* (May 3, 2011). The commenter stated that throughout the proposal EPA tries to suggest that it is returning to some earlier, "correct" interpretation of CAA section 112(n)(1) set forth in its 2000 action. *See, e.g., 76 FR 24989* ("The Agency's interpretation of the term appropriate' * * * is wholly consistent with the Agency's appropriate finding in 2000"); *id. at 24992* ("Our interpretation of the necessary finding is reasonable and consistent with the 2000 finding"). According to the commenter, the EPA did not provide in 2000 any interpretation of what it now characterizes as the "critical terms" of section 112(n)(1). *See, e.g., 70 FR 15999 n.13* (the "2000 finding does not provide an interpretation of the phrase after imposition of the requirements of the Act' "); *id. at 16000/2* (in 2000, the EPA "did not provide an interpretation of the term appropriate' "); *76 FR 24992* (the "Agency did not expressly interpret the term necessary in the 2000 finding"). The commenter believes that for that reason alone, it is impossible to

credit EPA's assertion that it "appropriately concluded that it was appropriate and necessary to regulate hazardous air pollutants * * * from EGUs" in 2000, and that it is today merely "confirm[ing] that finding and conclud[ing] that it remains appropriate and necessary to regulate these emissions.* * *"[53]

Response: The commenter disagrees with certain statements in the preamble to the proposed rule that provide that the Agency's interpretation of CAA section 112(n)(1) is reasonable and consistent with the 2000 finding. It is difficult to decipher the exact complaint that the commenter has with EPA's proposed rule in this regard, but the commenter does assert that "the Agency did not provide in 2000 any interpretation of what it now characterizes as the "critical terms" of CAA section 112(n)(1)." The commenter's assertion lacks foundation. Although the 2000 finding did not provide detailed interpretations of the regulatory terms at issue, it discussed the types of considerations relevant to the appropriate and necessary inquiry. For example, it is clear that in 2000, the Agency was concerned with the then current hazards to public health and the environment when assessing whether it was appropriate to regulate EGUs under section 112.[54] In addition, when evaluating whether it was necessary to regulate utilities, the Agency stated that it was necessary to regulate HAP emissions from U.S. EGUs under section 112 because the implementation of the other requirements of the Act would not adequately address the serious public health and environmental hazards arising from HAP emissions from EGUs. The Agency

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[53] *Id.* at 24,977/3.

[54] *65 FR 79830.*

also specifically noted that "section 112 is the authority intended to address" hazards to public health and the environment posed by HAP emissions. *Id.*

The detailed interpretation set forth in the preamble to the proposed rule is consistent with the 2000 finding, but EPA does not assert that the interpretation is in any way necessary to support the factual conclusions reached in the 2000 finding. Instead, we noted in the preamble to the proposed rule that our interpretation is consistent with the 2000 finding because in 2005 we interpreted the statute in a manner that was not consistent with the 2000 finding. The commenter has provided no legal support for its position that the Agency erred in interpreting the statute in a manner that is consistent with a prior factual finding.

Comment: Several commenters assert that in the 1990 amendments to the Clean Air Act, Congress directed the EPA to base its determination regarding regulation of fossil-fuel-fired generating units on consideration of any adverse public health effects identified in the study mandated by the first sentence of section 112(n)(1)(A) and that Congress did not dictate in section 112(n)(1)(A) that the EPA must regulate electric utility steam generating units under section 112.

According to the commenters the sponsor of the House bill that became section 112(n)(1)(A) provides an explanation that contradicts the EPA's approach to regulating EGUs:

> Pursuant to section 112(n), the Administrator may regulate fossil fuel fired electric utility steam generating units only if the studies described in section 112(n) clearly establish that emissions of

> any pollutant, or aggregate of pollutants, from such units cause a significant risk of serious adverse effects on the public health. Thus, * * * he may regulate only those units that he determines—after taking into account compliance with all provisions of the act and any other Federal, State, or local regulation and voluntary emission reductions—have been demonstrated to cause a significant threat of serious adverse effects on the public health.

136 Cong. Rec. H12,934 (daily ed. Oct. 26, 1990) (statement of Rep. Michael Oxley).

The commenters stated that the EPA position is premised on the assumption that "regulation under section 112" necessarily means "regulation under 112(d)" and falsely premised on the assumption that source categories listed by operation of section 112(n)(1)(A) cannot be regulated differently. The commenters conclude that the language of section 112(n)(1)(a) reflects Congress' intent that "regulation of HAP from EGUs was not intended to operate under section 112(d) but was instead intended to be tailored to the findings of the utility study mandated by section 112(n)(1)(A)."

Response: The commenters maintain that the Agency's interpretation of CAA section 112(n)(1) is flawed in many respects. The primary support for one commenter's arguments against EPA's interpretation, including in the comment above, is legislative history in the form of statements from one Congressman, Representative Oxley. The Supreme Court has repeatedly stated that the statements of one legislator alone should not be given much weight. *See Brock v. Pierce County, 476 U.S. 253, 263 (1986)* (finding that "statements by individual legislators should not be

given controlling effect, but *when they are consistent with the statutory language and other legislative history, they provide evidence of Congress' intent.*") (*emphasis added*) (citation omitted); *Garcia, et al., v. U.S., 469 U.S. 70, 78 (1984),* citing *Zuber v. Allen, 396 U.S. 168, 187 (1969)* (reiterating its prior findings, the Court indicated that isolated statements "are not impressive legislative history."); *Weinberger, et al., v. Rossi et al., 456 U.S. 25, 35* (declining to make a ruling based on "one isolated remark by a single Senator"); *Consumer Product Safety Comm., et al. v. GTE Sylvania, Inc., et al., 447 U.S. 102, 117-118 (1980)* (declining to give much weight to isolated remarks of one Representative); *Chrysler Corp. v. Brown, et al., 441 U.S. 281, 311 (1979)* (finding that "[t]he remarks of a single legislator, even the sponsor, are not controlling in analyzing legislative history."); *Zuber, 396 U.S. at 186* (concluding that "[f]loor debates reflect at best the understanding of individual Congressmen."); and *U.S. v. O'Brien, 391 U.S. 367, 384 (1968)* (in evaluating the statements of a handful of Congressmen, the Court concluded that "[w]hat motivates one legislator to make a speech about a statute is not necessarily what motivates scores of others to enact it. * * *."). As these cases show, the Supreme Court does not give weight to the statements of an individual legislator, except when the statements are supported by other legislative history and the clear intent of the statute. The commenters cited no case law that would support reliance on such limited legislative history.

The commenter has not cited any other legislative history to support Representative Oxley's statement, and the lack of additional support makes the statement of little utility or import under the case law. In fact, there does not appear to be anything in the

House, Senate, or Committee Reports that supports Oxley's statement. The lack of support for Oxley's statement in the Committee Report is particularly telling since, as the commenter notes, the House and Senate bills required different approaches to regulating EGUs under section 112, with the Senate bill requiring EGUs be regulated prior to the Utility Study. In fact, legislative statements from Senator Durenberger, a supporter of the Senate version, demonstrate that others would almost certainly not have agreed with Oxley's interpretation. For example, Senator Durenberger stated, "It seems to me inequitable to impose a regulatory regime on every industry in America and then exempt one category, especially a category like power plants which are a significant part of the air toxics problem."

Senator Durenberger discussed the negotiations with the Administration and the industry push to avoid regulation, including industry arguments for not regulating Hg from U.S. EGUs:

> The utility industry continued to adamantly oppose [regulation under section 112]. First, they argued that mercury isn't much of an environmental problem. But as the evidence mounted over the summer and it became clear that mercury is a substantial threat to the health of our lakes, rivers and estuaries and that power plants are among the principal culprits, they changed their tactic. Now they are arguing that mercury is a global problem so severe that just cleaning up U.S. power plants won't make enough of a difference to be worth it. They've gone from we're not a problem' to you can't regulate us until you address the whole global problem.' Recasting an issue that way is not new around here. So, it is

> not a surprise. But it does suggest the direction in which this debate will be heading in the next few years.

136 Cong. Rec. 36062 (October 27, 1990).

Senator Durenberger also explained why the House version was adopted:

> Given that a resolution of the difficult issues in the conference were necessary to conclude work on this bill, the Senate proposed to recede to the House provision which was taken from the original administration bill. It provides for a 3-year study of utility emissions followed by regulation to the extent that the Administrator finds them necessary. *Id.*

Senator Durenberger's statements indicate that it is unlikely that he would agree with Oxley's interpretation of CAA section 112(n)(1), a provision that provides the Agency with considerable discretion, and nothing indicates that others in the Senate (or for that matter anyone else in the House) would agree with that interpretation. Given the Supreme Court's views on the use of such limited legislative history, the EPA reasonably declined to consider (or even discuss) the legislative history in the preamble to the proposed rule and we believe it would be improper to ascribe Representative Oxley's statements to the entire Congress.

Moreover, Representative Oxley's statement directly conflicts with the statutory text. Representative Oxley stated that "[the Administrator may regulate only those units that he determines—*after taking into account compliance with all provisions of the act and any other Federal, State, or local regulation and voluntary emission reductions*—have been demon-

strated to cause a significant threat of serious adverse effects on the public health." 136 Cong. Rec. H12934 (daily ed. Oct. 26, 1990), reprinted in 1 1990 Legis. Hist. at 1416-17 *(emphasis added)*. However, the Utility Study required under CAA section 112(n)(1)(A) directs the Agency to consider the hazards to public health reasonably anticipated to occur after "imposition of the requirements of [the Clean Air Act]." EPA was not required to consider state or local regulations or voluntary emission reduction programs in the Utility Study, and that study is the only condition precedent to making the appropriate and necessary finding.[55]

The legislative history the commenters rely on is not controlling. The Agency believes that it has reasonably interpreted section 112(n)(1)(A), for all the reasons described herein and in the proposal. The commenters also cite Representative Oxley's statements as support for alternative interpretations of CAA section 112(n)(1). We believe that any arguments that rely on such limited legislative history are without merit.

Comment: One commenter stated that the EPA does acknowledge that, in many significant respects, its new interpretation of CAA section 112(n)(1) "differs from that set forth" in the Agency's 2005 rulemaking, but argues that its change of position is permissible.

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[55] In addition, the EPA only considered CAA requirements in the Utility Study and this was the correct approach because Congress knew how to require consideration of non-Federal requirements when directing EPA to conduct a study or assessment. See CAA section 112(n)(5) (Congress required EPA to conduct an assessment of hydrogen sulfide from oil and gas extraction activities and provided that the assessment "shall include review of existing State and industry control standards, techniques and enforcement.").

See 76 FR 24988/1 ("[T]o the extent our interpretation differs from that set forth in the 2005 Action, we explain the basis for that difference and why the interpretation, as set forth in this preamble, is reasonable."). In support, commenters note that the EPA cites *National Cable & Telecommunication Ass'n v. Brand X Internet Services, 545 U.S. 967 (2005).* The commenters agree that it is true that, in *Brand X Internet Services,* the Supreme Court explained that, if an agency "adequately explains the reasons for a reversal of policy," such change is "not invalidating," since the "whole point of Chevron is to leave the discretion provided by the ambiguities of a statute with the implementing agency." *545 U.S. at 981* (internal quotations omitted). The commenters maintain that all Brand X Internet Services was saying is that "[a]gency inconsistency is not a basis for declining to analyze the agency's interpretation under the *Chevron* framework." *Id.*

According to the commenter, it is not enough that the EPA has purported to "explain" why it has abandoned the interpretation of CAA section 112(n)(1) adopted in 2005. The commenter states that under the first step of *Chevron*, the Agency's latest interpretation must still be consistent with congressional intent. *See Chevron v. NRDC, 467 U.S. at 842-43.* The commenters state that under the second step of Chevron, if there is discretion for EPA to exercise in interpreting the "critical terms" of CAA section 112(n)(1), the Agency must properly define the range of that discretion and then act reasonably in exercising that discretion. *See Chevron, 467 U.S. at 843; see also Village of Barrington, Ill.* v. *Surface Transportation Bd.,* No. 09-1002 (D.C. Cir. Mar. 15, 2011).The commenters allege that the EPA failed to properly define and exercise the scope of its discretion. In each

instance, the commenter maintains that the Agency has departed from the correct interpretation of CAA section 112(n)(1) that it adopted in 2005, seizing instead upon a new approach that is contrary to the plain language of the CAA itself, as interpreted after considering the statements of Representative Oxley.

Response: The commenter appears to argue that the EPA's interpretation of CAA section 112(n)(1) is not consistent with the plain language of the statute, implying that the statute is clear and must be evaluated under step one of Chevron.*See Chevron v. NRDC, 467 U.S. 837 842-42 (1984)* (finding that when the legislative intent is clear no additional analysis is required). However, as noted above, much of the commenter's argument that the plain language of the statute precludes EPA's interpretation is based on the unpersuasive legislative history discussed above. As explained in the preamble to the proposed rule, the statute directs the Agency to determine whether it is appropriate and necessary to regulate EGUs under section 112. As the D.C. Circuit has held, the terms "appropriate" and "necessary" are very broad terms. Because these terms are broad they are susceptible to different interpretations. We believe we have reasonably interpreted the appropriate and necessary language in section 112(n)(1)(A). To the extent that interpretation differs from the one set forth in 2005, we have fully explained the basis for such changes. *See 76 FR 24986-24993* (setting forth the Agency's interpretation of section 112(n)(1)).

Furthermore, we properly considered the scope of our discretion in interpreting the statute as explained in detail in the preamble to the proposed rule. We believe the interpretation set forth in the preamble to the proposed rule is consistent with the Act and,

therefore, the Agency should be afforded deference pursuant to *National Cable & Telecommunication Ass'n v. Brand X Internet Services, 545 U.S. 967 (2005).*

Comment: A number of commenters agreed with the Agency's interpretation of section 112(n)(1) and the terms appropriate and necessary. The commenters also agreed that the EPA's interpretation of that provision was reasonable and consistent with the statute.

Response: We agree with the commenters and appreciate their support.

Comment: One commenter asserts that the EPA's ultimate motivation for rejecting its prior interpretation of CAA section 112(n)(1) and embracing this flawed new approach is made clear from the very outset of the proposal. According to the commenter, the EPA touts the fact that "one consequence" of the MACT rule would be that the "market for electricity in the U.S. will be more level" and "no longer skewed in favor of the higher polluting units that were exempted from the CAA at its inception on Congress' assumption that their useful life was near an end." *See 76 FR 24979/2.* The MACT rule would "require companies to make a decision—control HAP emissions from virtually uncontrolled sources" or else "retire these sometimes 60 year old units and shift their emphasis to more efficient, cleaner modern methods of generation, including modern coal-fired generation." *Id.*

The commenter stated that this remarkably forthright statement establishes that the underlying basis for EPA's proposal to regulate EGUs under CAA section 112 is not to address any "hazards to public

health" that might be attributed to the emission by EGUs of HAP listed under CAA section 112(b). Rather, according to commenter, the EPA is utilizing the regulation of EGUs under CAA section 112 as a means to an entirely different end: To force the imposition of controls that will also have the result of reducing non-HAP emissions (primarily PM) or force the shutdown of those units for which the cost of such controls would be prohibitive. At the same time, according to commenter, the EPA tacitly acknowledges that it cannot hope to make out a case that the regulation of EGU HAP emissions is "appropriate and necessary" within the meaning of CAA section 112(n)(1). The commenter asserts that the only HAP whose health-related benefits EPA quantifies is Hg. Elsewhere, the commenter stated that the EPA contends there are "additional health and environmental effects" attributable to HAP other than Hg, but admits that it has "not quantified" those risks due supposedly to "insufficient information."*See 76 FR 24999/2*. With respect to Hg the commenter stated that the benefits are so questionable and miniscule, some $ 4 million to $ 6 million (given a 3 percent discount rate), that compared to the total social costs of the rule (*i.e.*, nearly $ 11 billion) the rule cannot be justified were EPA properly to interpret CAA section 112(n)(1) and undertake the sort of regulatory analysis Congress intended. The commenter stated that the reason that the EPA touts in this rulemaking the health benefits EPA attributes to the reduction of non-hazardous air pollutants (again, primarily PM), the regulation of which is authorized under provisions of the CAA apart from CAA section 112, is to elide the inconvenient truth regarding the truly trivial nature of the benefits attributable to HAP regulation itself. The commenter concludes that the

EPA distorts CAA section 112(n)(1)(A) "beyond all recognition."

One commenter stated that the EPA is directed by CAA section 112(n)(1)(A) to study the "hazards to public health anticipated to occur as a result of emissions" by EGUs of "pollutants listed under subsection (b) of this section"—*i.e.*, HAP and HAP alone. Thereafter, the EPA is authorized to regulate EGU HAP emissions if, and only if, they determine that "such regulation" of HAP emissions is "appropriate and necessary" to address the "hazards to public health" that may be attributable to HAP emissions. According to the commenter, by contrast, in this rulemaking, the EPA has seized upon the fact that the control of EGU HAP emissions will also control non-HAP (such as PM), and then seeks to justify the regulation of HAP emissions based almost entirely on the health benefits of the reductions in non-HAP emissions that would be coincidentally achieved. The commenter believes that this "regulatory sleight-of-hand" runs afoul of congressional intent and is unlawful.

Response: The commenter alleges that the health-related benefits to regulating HAP emissions from EGUs are "questionable and miniscule," and that the only real benefits stem from non-HAP emissions, such as PM. The commenter also implies that regulation of HAP is nothing more than a straw man and that the Agency's ultimate goal is to regulate other pollutants, and specifically PM. These allegations are wholly without merit. The Agency has conducted comprehensive technical analyses that confirm that HAP emissions from EGUs pose a hazard to public health. The analyses are discussed at length elsewhere in this final rule, and a review of the proposed and final rules

utterly refutes commenter's assertion that PM reductions form the basis for the appropriate and necessary finding. In addition, the commenter appears to ignore the Agency's findings concerning the hazards to public health and the environment posed by HAP emissions simply because the Agency is not able to quantify many of the benefits associated with reductions of HAP emissions from EGUs or because the estimated HAP benefits that are quantified are small in relation to the co-benefits achieved through reductions in non-HAP air pollutants, such as PM and SO[2], which are surrogates for certain HAP. The Agency is regulating EGUs pursuant to section 112(d) for all of the reasons explained in the preamble and discussed elsewhere in this response to comments. The commenter fails to recognize that the statute neither requires a cost-benefit analysis prior to finding it appropriate and necessary to regulate EGUs, nor requires such analysis prior to setting emission standards. Indeed, Congress expressly precluded consideration of costs when setting MACT floors. As explained below, the EPA does not believe that it is appropriate to consider costs when determining whether to regulate EGUs under CAA section 112.

Comment: One commenter stated that the EPA has ignored the language and intent of CAA section 112(n)(1)(A), as interpreted based on Representative Oxley's statements, and that the Agency's interpretation of this provision violates step one of Chevron. Under Chevron where the "intent of Congress is clear," that is the "end of the matter," for both the implementing agency and a reviewing court "must give effect to the unambiguously expressed intent of Congress." *Chevron, 467 U.S. at 842-43.* The commenter asserts that the legislative history of CAA section 112(n)(1)(A) "sheds considerable light on

Congress' unique approach to regulation of EGUs under CAA § 112." According to the commenter, on April 3, 1990, the Senate passed S. 1630. The Senate bill would have required EPA to list EGUs under CAA section 112(c) and to regulate them under the MACT provisions of CAA section 112(d). *See* S. 1630 section 301, 3 1990 Legis. Hist. at 4407. Thereafter, the House of Representatives passed a modified version of S. 1630 on May 23, 1990. This House version substantially changed the provisions of CAA section 112 as they applied to EGUs. *See* 1 1990 Legis. Hist. at 572-73. The House version was virtually identical to the current CAA section 112(n)(1)(A), and was ultimately adopted by the conference committee, enacted by Congress and signed into law. According to the commenter, Congress expressly rejected the "list-under-(c)-and-regulate-under-(d)" approach that S. 1630 would have applied to EGUs, and that Congress did choose to apply to other source categories. The commenter stated that the EPA's interpretation that the Agency is "required to establish emission standards for EGUs consistent with the requirements set forth in section 112(d)" (*Id.* at 24,993/3) fails to take the legislative history into account, and in a footnote, the commenter states that the Agency erred by not addressing the legislative history as it did in the 2005 action.

Response: For the reasons stated above, we believe commenter's reliance on the single statement of one legislator is flawed. In addition, in a footnote the commenter stated that the EPA recognized "that it had to address" the legislative history in its 2005 action, and that the EPA erred in this case because we did not address the legislative history. The commenter cites no case law to support its contention that an Agency must "address" unpersuasive legislative

history. Further, in the 2005 action, the EPA relegated to a footnote the Oxley statement that commenter relies on so heavily even though the statement supported the interpretation we provided in that rule. We recognized then what the commenter fails to recognize now, which is that the Agency cannot argue that the meaning of CAA section 112(n)(1)(A) is clear based on the statements of one legislator.

Furthermore, the Agency's interpretation does not violate Chevron Step 1. The terms "appropriate" and "necessary" are ambiguous. The statements of a lone legislator do not transform those ambiguous words into a Chevron Step 1 situation.

Moreover, the commenter's assertion that Congress unambiguously defined the factors to consider in making the appropriate determination is without merit. We fully explain in the preamble to the proposed rule the basis for the Agency's interpretation, and we are not revising that interpretation based on the comments received.

Finally, the EPA notes that the sentence concerning regulation under CAA section 112(d) that the commenter quotes from the preamble states, in full: "Congress did not exempt EGUs from the other requirements of section 112 and, *once listed*, the EPA is required to establish emission standards for EGUs consistent with the requirements set forth in section 112(d), as described above." *76 FR 24993* (*emphasis added*). The EPA discusses requirements to regulate section 112(c) listed sources under section 112(d) in response to other comments.

c. Consideration of Both Environmental Effects and Health Effects From Other Sources

Comment: Several commenters stated that the EPA acts contrary to congressional intent when the Agency considers itself "thereby authorized to consider environmental effects' and the effects of HAP emissions from non-EGU sources, in making its appropriate and necessary' finding under subparagraph (n)(1)(A)."

Commenters assert that the EPA misreads CAA section 112(n)(1)(B) and (C) to inject environmental effects in the CAA section 112(n)(1)(A) determination. According to one commenter the plain language of CAA section 112(n)(1) establishes that regulation of EGUs is to be predicated solely on "hazards to public health" attributable to HAP emissions. The legislative history providing that the EPA "may regulate [EGUs] only if the studies described in section 112(n) clearly establish that emissions of any pollutant * * * from such units cause a significant risk of serious adverse risk to the public health" confirms that plain language. *See* Oxley Statement at 1416-17. The commenter further stated that nothing on the face of CAA section 112(n)(1)(A) indicates that Congress intended that the EPA should (or must) take into account any additional information that might be developed through the other studies mentioned in subparagraphs (n)(1)(B) and (C) (*i.e.*, the Mercury Study[56] and the NAS Study[57]), such as HAP emissions from non-EGU sources. The commenter also identified other

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[56] U.S. EPA. 1997. *Mercury Study Report to Congress*. EPA-452/R-97-003. December.

[57] NAS, 2000.

provisions of section 112 that specifically require consideration of environmental effects and states that Congress would have requires such consideration in CAA section 112(n)(1) if it had wanted EPA to consider environmental effects.

The commenter makes a related assertion that the EPA acts contrary to congressional intent by assuming authority to assess the " hazard to public health or the environment [from] HAP emissions from EGUs alone' or the result of HAP emissions from EGUs in conjunction with HAP emissions from other sources'" (citing *76 FR at 24,988/1*). According to the commenter, the only evident basis for the Agency's interpretation that, in making its "appropriate and necessary" finding, the EPA can (and should) take into account HAP emissions from sources other than EGUs, is that the Mercury Study authorized by CAA 112(n)(1)(B) references "mercury emissions from * * * municipal waste combustion units, and other sources, including area sources," in addition to EGUs. The commenter asserts, however, that subparagraph (n)(1)(A) identifies the Utility Study as the sole study to inform EPA's "appropriate and necessary" finding. The commenter states that if Congress had intended that the EPA take into account information developed through the Mercury Study, Congress "would not have specified that the EPA was to predicate its appropriate and necessary' finding on the results of the study required by this subparagraph' (n)(1)(A)."

Commenter also cites to a number of other section 112 provisions that expressly address environmental effects and the commenter states the only conclusion to draw from the inclusion in those provisions and the absence of such language in section 112(n)(1)(A) is

that Congress intended public health to be the only basis for the appropriate and necessary finding.

Response: The commenter again relies in part on the statements of one legislator to attack EPA's reasoned interpretation of an ambiguous statute. To the extent the commenter's arguments rely on this limited evidence, we refer to the response above. As we stated above, CAA section 112(n)(1) is an ambiguous statutory provision; thus, the EPA's interpretation, not commenter's, is entitled to considerable deference if it is a reasonable reading of the statute. *Chevron, 467 U.S. at 843-44.* For the reasons described herein and in the proposal, we believe that we have reasonably interpreted the statutory terms at issue here. The Agency directs attention to section III.A. of the proposed rule, which includes a thorough discussion of the Agency's interpretation of the relevant statutory terms. To the extent the commenters disagree with EPA's interpretations, the EPA refers back to its discussion in the proposal and responds to the comments as follows.

The commenter appears to maintain that the EPA must interpret the scope of the appropriate and necessary finding solely in the context of the CAA section 112(n)(1)(A) Utility Study, such that only hazards to public health and only EGU HAP emissions may be considered. The commenter incorrectly conflates the requirements for the Utility Study with the requirement to regulate EGUs under CAA section 112 if EPA determines it is appropriate and necessary to do so. The commenter concedes that the Agency may consider information other than that contained in the Utility Study, but only to the extent it relates specifically to hazards to public health directly attributable to HAP emissions from EGUs. We agree that

we may consider additional information other than that contained in the Utility Study, as we stated in the preamble to the proposed rule, because courts do not interpret phrases like "after considering the results of" in a manner that precludes the consideration of other information. *See United States v. United Technologies Corp., 985 F.2d 1148, 1158 (2nd Cir. 1993)* ("based upon" does not mean "solely);[58] *see also 76 FR 24988.* We further explained in the preamble to the proposed rule that it was reasonable to interpret the scope of the appropriate and necessary finding in the context of all three studies required under CAA section 112(n)(1) because the provision is title "Electric utility steam generating units."[59] The commenter has provided little more than unpersuasive legislative history to support its restrictive interpretation of our authority. *Id.*

The commenter also argues that the statute clearly prohibits the Agency from considering adverse environmental effects or the cumulative effects of HAP emissions from EGUs and other sources based on its claim that the statute is clear when one *properly* considers the legislative history. Again, the commenter has provided no support for its contention other than the statements of one Representative and the improper conflation of the CAA section 112(n)(1)(A)

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[58] Several commenters have taken issue with our citation to *United States* v. *United Technologies Corp.* because the language at issue in that case was "based upon" and the language of section 112(n)(1)(A) is "after considering the results of." We believe that, if anything, "based upon" is more prescriptive than "after considering the results of" such that the case supports the Agency's interpretation that additional information other than the Utility Study may be considered in making the appropriate and necessary finding.

[59] *76 FR 24986-87.*

direction on the conduct of the Utility Study and the appropriate and necessary finding. Congress left it to the Agency to determine whether it is appropriate and necessary to regulate EGUs under CAA section 112 and the statute does not limit the Agency to considering only hazards to public health and only harms directly and solely attributable to EGUs.

The commenter stated that Congress specifically told EPA when it wanted EPA to consider adverse environmental effects in CAA section 112 and cites to several provisions of the Act that require consideration of adverse environmental effects. The commenter ignores CAA section 112(n)(1)(B), which directs the Agency to consider adverse environmental effect. In any event, even were we to view section 112 (n)(1)(A) in isolation, as the commenter suggests, we still maintain that we can consider adverse environmental effects under 112(n)(1)(A). Nothing in section 112(n)(1)(A) precludes consideration of environmental effects. Congress required the Agency to assess whether it is appropriate and necessary to regulate EGUs under section 112. We believe that adverse environmental effects can be considered in the appropriate analysis. Congress specifically directed the Agency to consider adverse environmental effects when delisting source categories pursuant to section 112(c)(9), and thus we believe it is reasonable to consider such effects when determining whether it is appropriate to regulate such units under section 112, especially given that Congress did not limit our appropriate and necessary inquiry to the Utility Study. See CAA section 112(c)(9)(B)(ii).

Moreover, the other provisions of CAA section 112 that specifically discuss environmental effects have purposes that are distinguishable from CAA section

112(n)(1), and we do not believe one can reasonably draw the conclusion that the commenter does when comparing those provisions to CAA section 112(n)(1)(A). The lack of a requirement to consider environmental effects in CAA section 112(n)(1)(A) does not equate to a prohibition on the consideration of environmental effects as the commenter concludes. The EPA maintains that it reasonably concluded that we should protect against identified or potential adverse environmental effects absent clear direction to the contrary.

Concerning the consideration of the cumulative effect of HAP emissions from EGUs and other sources, we provided a reasonable interpretation of the statute and noted that our interpretation, unlike commenters, does not "ignore the manner in which public health and the environment are affected by air pollution. An individual that suffers adverse health effects as the result of the combined HAP emissions from EGUs and other sources is harmed, irrespective of whether HAP emissions from EGUs alone would cause the harm."[60]

d. Finding for All HAP To Be Regulated

Comment: Several commenters stated that for those EGU HAP for which the Agency makes no CAA section 112(n)(1)(A) determination, their regulation under CAA section 112 is not authorized. For example, one commenter maintains that the Agency could regulate HAP emissions from EGUs under CAA section 112(n). Accordingly, to the extent that the EPA reads CAA section 112, as construed by *National Lime Ass'n,* as compelling it to regulate all HAP emitted by EGUs, should the Agency make an "appropriate and necessary" determination under CAA section 112 (n)(1)(A) with respect to a single HAP (*e.g.*, Hg), the

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[60] *76 FR 24988.*

EPA stands poised to commit a fundamental legal error that will condemn the final rule on review. Cf., *e.g.*, *PDK Laboratories, Inc., 362 F.3d at 797-98; Holland v. Nat'l Mining Ass'n, 309 F.3d at 817* (where an agency applies a Court of Appeals "interpretation * * * because it believed that it had no choice" and that it "was effectively coerced' to do so," then the agency "cannot be deemed to have exercised its reasoned judgment").

Response: We do not agree with the commenter's assertion that Congress intended EPA to regulate only those EGU HAP emissions for which an appropriate and necessary finding is made, and the commenter has cited no provision of the statute that states a contrary position. The EPA reasonably concluded that we must find it "appropriate" to regulate EGUs under CAA section 112 if we determine that a single HAP emitted from EGUs poses a hazard to public health or the environment. If we also find that regulation is necessary, the Agency is authorized to list EGUs pursuant to CAA section 112(c) because listing is the logical first step in regulating source categories that satisfy the statutory criteria for listing under the statutory framework of CAA section 112. *See New Jersey, 517 F.3d at 582* (stating that "[s]ection 112(n)(1) governs how the Administrator decides whether to list EGUs. * * *"). As we noted in the preamble to the proposed rule, D.C. Circuit precedent requires the Agency to regulate all HAP from major sources of HAP emissions once a source category is added to the list of categories under CAA section 112(c). *National Lime Ass'n v. EPA, 233 F.3d 625, 633 (D.C. Cir. 2000). 76 FR 24989.*

The commenter does not explain its issues with our interpretation of how regulation under section 112

works—*i.e.* making a determination that a source category should be listed under CAA section 112(c), listing the source category under CAA section 112(c), regulating the source category under CAA section 112(d), and conducting the residual risk review for sources subject to MACT standards pursuant to CAA section 112(f). Instead, it asserts that our decision is flawed because the interpretation we provided does not account for all the alternatives for regulating EGUs under section 112, and that we have not properly exercised our discretion leading to a fatal flaw in our rulemaking.

The commenter also ignores the language of section 112(n)(1)(A). As explained in the proposed rule, the use of the terms section, subsection, and subparagraph in section 112(n)(1)(A) demonstrates that Congress was consciously distinguishing the various provisions of section 112 in directing EPA's action under section 112(n)(1)(A). Congress directed the Agency to regulate utilities "under this section," not "under this subparagraph," and accordingly EGUs should be regulated under section 112 in the same manner as other categories for which the statute requires regulation. Furthermore, the D.C. Circuit Court found that section 112(n)(1) "governs how the Administrator decides whether to list EGUs" and that once listed, EGUs are subject to the requirements of section 112. *New Jersey, 517 F.3d at 583.* Indeed, the D.C. Circuit Court expressly noted that "where Congress wished to exempt EGUs from specific requirements of section 112, it said so explicitly," noting that "section 112(c)(6) expressly exempts EGUs from the strict deadlines imposed on other sources of certain pollutants." *Id.* Congress did not exempt EGUs from the other requirements of section 112, and once listed, the EPA is reasonably regulating EGUs

pursuant to the standard-setting provisions in section 112(d), as it does for all other listed source categories.

The commenter provided no alternative theory for regulating EGUs under CAA section 112, other than to state that the EPA could regulate under CAA section 112(n)(1). However, even assuming for the sake of argument, that we could issue standards pursuant to CAA section 112(n)(1), we would decline to do because there is nothing in section 112(n)(1)(A) that provides any guidance as to how such standards should be developed. Any mechanism we devised, absent explicit statutory support, would likely receive less deference than a CAA section 112(d) standard issued in the same manner in which the Agency issues standards for other listed source categories. We would also decline to establish standards under section 112(n)(1) because Congress did provide a mechanism under CAA sections 112(d) and (f) for establishing emission standards for HAP emissions from stationary sources and it is reasonable to use that mechanism to regulate HAP emissions from EGUs.

e. Considering Costs in Finding

Comment: Several commenters assert that the EPA must consider costs in assessing whether regulation of EGUs is appropriate under CAA section 112(n)(1)(A). Commenters posit that the EPA's position that "the term appropriate' * * * does not allow for the consideration of costs in assessing whether hazards * * * are reasonably anticipated to occur based on EGU emissions," *76 FR at 24,989/1*, does not withstand scrutiny. According to the commenters, the treatment of "costs" under section 112(c) does not support the Agency's position, and the process by which sources may be "delisted" under section 112(c)(9), including no consideration of costs, sheds no light on the

circumstances under which it may be "appropriate" to regulate EGUs under section 112(n)(1)(A).

Commenters characterize as "unintelligible" the EPA's position that it is "reasonable to conclude that costs may not be considered in determining whether to regulate EGUs" when "hazards to public health and the environmental are at issue (citing *76 FR at 24989).* "Two commenters stated that a natural reading of the term "appropriate" would include the consideration of costs. According to the commenters, something may be found to be "appropriate" where it is "specially suitable," "fit," or "proper." *See* Webster's Third New International Dictionary at 106 (1993). The term "appropriate" carries with it the connotation of something that is "suitable or proper in the circumstances." *See* New Oxford American Dictionary (2d Ed. 2005). Considering the costs associated with undertaking a particular action is inextricably linked with any determination as to whether that action is "specially suitable" or "proper in the circumstances." One commenter notes that in 2005 *(70 FR 15994, 16000;* March 29, 2005) the EPA used the dictionary definition of "appropriate," as being "especially suitable or compatible" and that it would be difficult to fathom how a regulatory program could be either "suitable" or "compatible" for a given public health objective without consideration of cost.

One commenter asserts that on the face of CAA section 112(n)(1)(A), it is clear that the EPA is expected to consider costs. According to the commenter, that Congress intended that the EPA investigate and consider "alternative control strategies" for emissions as part of the section 112 (n)(1) Utility Study when making the "appropriate and necessary" determination refutes the notion that the Agency can,

and indeed must, disregard the cost of regulation in making that determination, because the cost of a given emission "control strategy" is a central factor in any evaluation of "alternative" controls.

Further, according to commenters, it is well-settled that CAA regulatory provisions should be read with a presumption in favor of considering costs (citing *Michigan v. EPA, 213 F.3d 663, 678 (D.C. Cir. 2000)*), and the legislative history of section 112(n)(1)(A) confirms that Congress intended EPA to consider costs (citing Oxley Statement at 1417).

Commenters also assert that the EPA falsely represents that it "did not consider costs when making the "appropriate" determination in the EPA's December 2000 notice *(76 FR at 24,989/2)*.

Response: The commenters first take issue with EPA's explanation of why the Agency determined that costs should not be considered in making the appropriate determination. What commenters do not identify is an express statutory requirement that the Agency consider costs in making the appropriate determination. Congress treated the regulation of HAP emissions differently in the 1990 CAA amendments because the Agency was not acting quickly enough to address these air pollutants with the potential to adversely affect human health and the environment. *See New Jersey, 517 F.3d at 578.* Specifically, following the 1990 CAA amendments, the CAA required the Agency to list source categories and nothing in the statute required us to consider costs in those listing decision, and we have not done so when listing other source categories. Thus, it is reasonable to make the listing decision, including the appropriate determination, without considering costs.

The commenters next argue that the Agency is compelled by the statute to consider costs based on a dictionary definition of "appropriate" and the CAA section 112(n)(1)(A) direction to consider alternative control strategies for regulating HAP emissions in the Utility Study.

Concerning the definition of "appropriate", commenters stated:

> Not only is it "reasonable" for EPA to consider costs in determining whether it is "appropriate" to regulate EGU HAP emissions, a natural reading of the term indicates that excluding the consideration of costs would be entirely unreasonable. Something may be found to be "appropriate" where it is "specially suitable," "fit," or "proper." *See* Webster's Third New International Dictionary at 106 (1993). The term "appropriate" carries with it the connotation of something that is "suitable or proper in the circumstances." *See* New Oxford American Dictionary (2d Ed. 2005) at 76. Considering the costs associated with under-taking a particular action is inextricably linked with any determination as to whether that action is "specially suitable" or "proper in the circumstances."

The EPA believes the definition of "appropriate" that the commenters provide wholly support its interpretation and nothing about the definition compels a consideration of costs. It is appropriate to regulate EGUs under CAA section 112 because EPA has determined that HAP emissions from EGUs pose hazards to public health and the environment, and section 112 is "specially suitable" for regulating HAP emissions, and Congress specifically designated CAA section 112 as the "proper" authority for regulating

HAP emissions from stationary sources, including EGUs. Section 112 of the CAA is "suitable [and] proper in the circumstances" because EPA has identified a hazard to public health and the environment from HAP emissions from EGUs and Congress directed the Agency to regulate HAP emissions from EGUs under that provision if we make such a finding. Cost does not have to be read into the definition of "appropriate" as commenter suggests. In addition, as stated elsewhere in response to comments, the Agency does not consider costs in any listing or delisting determinations, and the EPA maintains that it is reasonable to assess whether to list EGUs (*i.e.* the appropriate and necessary finding) without considering costs.

The commenters' argument that costs must be considered based on the CAA section 112(n)(1)(A) requirement to "develop and describe alternative control strategies" in the Utility Study is equally flawed. The argument is flawed because Congress did not direct the Agency to consider in the Utility Study the costs of the controls when evaluating the alternative control strategies. In addition, the EPA did not consider the costs of the alternative controls in the Utility Study, as implied by the commenter. Thus, even viewing section 112(n)(1)(A) in isolation, there is nothing in that section that compels EPA to consider costs. For the reasons described herein, we do not believe that it is appropriate to consider costs in determining whether to regulate EGUs under section 112.

Additionally, one commenter attempts to refute EPA's statement in the preamble to the proposed rule that the EPA did not consider costs in the 2000 finding by pointing to the only two mentions of cost in that notice. However, the EPA did not say that costs were

not mentioned in the 2000 finding and a review of the regulatory finding will show that costs were not considered in the regulatory finding. *65 FR 79830* (December 20, 2000) ("Section III. What is EPA's Regulatory Finding?").

f. Considering Requirements of the CAA in "Necessary"

Comment: Several commenters disagree with EPA's position that it need consider "only those requirements that Congress directly imposed on EGUs through the CAA as amended in 1990," for which "EPA could reasonably predict HAP emission reductions at the time of the Utility Study." According to the commenters, the statutory language of CAA section 112(n)(1) requires that the EPA consider the scope and effect of EGU HAP emissions after the imposition of all of the "requirements" of the CAA, not just the Acid Rain program. The commenter maintains that it would have been easy enough for Congress in subparagraph 112(n)(1)(A) to specify "after imposition of the requirements of Title IV of this chapter," but Congress did not. The commenters further add that the legislative history confirms that Congress meant something much broader than that, providing that the EPA is authorized to regulate EGUs under CAA section 112 only after "taking into account compliance with all provisions of the act and any other Federal, State, or local regulation and voluntary emission reductions." The commenters stated that the CAA's "requirements" include the submission by states of ozone and fine PM attainment demonstrations, as well as SIP provisions needed to reach attainment of the NAAQS because such provisions could include controls on EGUs to reduce SO_2 and NO_X, which controls could also result in a reduction in Hg emissions.

Response: The commenter's characterization of the facts is flawed and its reliance on legislative history that is in direct conflict with the express terms of the statute is unpersuasive.

On the facts, the EPA explained in the preamble to the proposed rule its interpretation of the phrase "after imposition of the requirements of [the Act]" as it related to the conduct of the Utility Study.[61] We reasonably concluded that, since Congress only provided 3 years after enactment to conduct the study, the phrase referred to requirements that were directly imposed on EGUs through the CAA amendments and for which the Agency could reasonably predict co-benefit HAP emission reductions. *Id.* The EPA did not state that the phrase only applied to the Acid Rain program, as commenter asserts, and the Utility Study in fact discussed other regulations, including the NSPS for EGUs and revised NAAQS. With regard to the latter, the EPA ultimately determined that it could not sufficiently quantify the reductions that might be attributable to the NAAQS because states are tasked with implementing those standards. *See* Utility Study, pages ES-25, 1-3, 2-32. Conversely, commenter's position is that the EPA must consider implementation of *all* the requirements of the CAA, but it does not indicate how in conducting the Utility Study the Agency could have possibly considered co-benefit HAP reductions attributable to all future CAA requirements. The Agency appropriately considered the other requirements of the Act in the Utility Study and considered those requirements in determining that it was necessary to regulate coal- and oil-fired EGUs in December 2000.

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[61] *76 FR 24990.*

Although not required, the Agency in the preamble to the proposed rule conducted further analyses in support of the 2000 finding. In doing so, we considered a number of requirements that far exceed what Congress contemplated when enacting CAA section 112(n)(1)(A)), and our analyses still show that it remains necessary to regulate coal- and oil-fired EGUs under section 112. *76 FR 24991.*

We maintain that we have reasonably interpreted the requirement to consider the hazards to public health and the environment reasonably anticipated to occur after imposition of the requirements of the Act as explained in the preamble to the proposed rule.[62] In addition, as stated above, we also believe it would be reasonable to find it necessary to regulate HAP emissions from EGUs based on our finding that such emissions pose a hazard to public health and the environment today without considering future reductions that we currently project to occur as the result of imposition of CAA requirements that are not yet effective (*e.g.*, CSAPR).

Moreover, Representative Oxley's statement cited by the commenter is not consistent with the express terms of CAA section 112(n)(1)(A) on this issue. Representative Oxley stated that the EPA was to take "into account compliance with all the provisions of the act and any other Federal, State, or local regulation and voluntary emission reductions," but CAA section 112(n)(1)(A) directs the Agency to consider "imposition of the requirements of this chapter," which means the CAA. The Agency reasonably focused on the requirements of the Clean Air Act, which are federally enforceable, and declined to include potential future

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[62] *76 FR 24990.*

reductions that may be attributable to voluntary emission reduction programs or state and local regulations that have no basis in the Clean Air Act and are not federally enforceable. In addition to the statutory direction not to consider such requirements, the EPA believes it is reasonable not to include potential reductions attributable to such requirements because the Agency cannot assure that such requirements and the attendant HAP reductions will remain absent regulation under section 112. Finally, the commenter implies that EPA's position is that the Agency will only consider requirements of the Act that directly regulate HAP emissions. The EPA never stated or suggested that interpretation and a fair reading of the proposed rule will demonstrate that EPA considered requirements that achieve co-benefit HAP emission reductions, for example the Transport Rule (known as CSAPR).

Comment: One commenter stated that, under CAA section 112, regulating EGUs is permissible only insofar as it is focused, targeted, and predicated on concrete findings by the Agency that such regulation is indeed "necessary." According to the commenter, the EPA construes CAA section 112(n)(1)(A) as permitting it to find that it is "necessary" to regulate EGUs even where the Agency does not actually know whether it is "necessary" to regulate EGUs. Citing the D.C. Circuit, the EPA suggests that "there are many situations in which the use of the word necessary, 'in context, means something that is done, regardless of whether it is indispensible,' "in order to "achieve a particular end.'" *76 FR 24990,* quoting *Cellular Telecommunications v. FCC, 330 F.3d 502, 510 (D.C. Cir. 2003).* The commenter stated that in the "context" of CAA section 112(n)(1)(A), as informed by the relevant legislative history from Representative

Oxley, it is clear that regulation of EGU HAP emissions can be considered "necessary" only if EPA were to "clearly establish" that such regulation was effectively "indispensible" to address the identified harm. As EPA concedes that it has made no such determination here, its proposal is fatally flawed for that reason alone.

The commenter further asserts that the EPA erred when it concluded that it may "determine it is necessary to regulate under section 112 'when the Agency is uncertain whether imposition of the requirements of the CAA will address the identified hazards' "(citing *76 FR at 24,991/3*). According to the commenter, the EPA "cannot take refuge in its own uncertainty' to support a finding that it is necessary 'to regulate EGUs under section 112, and the Act precludes the EPA from "err[ing] on the side of regulation' "in face of uncertainty (*id.*). The commenter also implies that the finding was based on non-HAP emissions.

Response: The commenter again relies on the legislative statements of one Representative and asserts that the statements are controlling. The EPA disagrees with commenter and maintains that its interpretation of the term "necessary" is reasonable. *76 FR 24990-92 (Section III.A.2.b of the preamble to the proposed rule contains the EPA's interpretation of the term "necessary".) 76 FR 24990-92* (Section III.A.2.b of the proposed rule contains EPA's interpretation of the term "necessary".) The commenter also, in a footnote, implies that EPA based the appropriate and necessary finding on non-HAP air pollution. The commenter is wrong as explained in more detail above.

As an initial matter, this comment is only addressing one aspect of the Agency's interpretation of the term necessary. As EPA stated at proposal:

> If we determine that the imposition of the requirements of the CAA will not address the identified hazards, EPA must find it necessary to regulate EGUs under section 112. Section 112 is the authority Congress provided to address hazards to public health and the environment posed by HAP emissions and section 112(n)(1)(A) requires the Agency to regulate under section 112 if we find regulation is "appropriate and necessary." If we conclude that HAP emissions from EGUs pose a hazard today, such that it is appropriate, and we further conclude based on our scientific and technical expertise that the identified hazards will not be resolved through imposition of the requirements of the CAA, we believe there is no justification in the statute to conclude that it is not necessary to regulate EGUs under section 112.

76 FR 24991.

The EPA has determined that the imposition of the requirements of the CAA will not address the hazards to public health or hazards to the environment that EPA has identified; therefore, it is necessary to regulate EGUs under CAA section 112.

The EPA further interpreted the statute to allow the Agency to find that it is necessary to regulate EGUs under other circumstances, and it is with one of our additional interpretations that commenter takes issue. Specifically, the commenter argues that EPA's interpretation authorizes the Agency to find it necessary to regulate EGUs when we are uncertain it

is necessary, but that misconstrues our interpretation and the record. At proposal, the EPA stated:

> In addition, we may determine it is necessary to regulate under section 112 even if we are uncertain whether the imposition of the requirements of the CAA will address the identified hazards. Congress left it to EPA to determine whether regulation of EGUs under section 112 is necessary. We believe it is reasonable to err on the side of regulation of such highly toxic pollutants in the face of uncertainty. Further, if we are unsure whether the other requirements of the CAA will address an identified hazard, it is reasonable to exercise our discretion in a manner that assures adequate protection of public health and the environment. Moreover, we must be particularly mindful of CAA regulations we include in our modeled estimates of future emissions if they are not final or are still subject to judicial review ([*e.g.*], the Transport Rule). If such rules are either not finalized or upheld by the Courts, the level of risk would potentially increase.

Id.

The CAA requires EPA to exercise its discretion in determining whether regulation under section 112 is necessary, and the D.C. Circuit has stated that "there are many situations in which the use of the word necessary,' in context, means something that is done, regardless of whether it is indispensible, to achieve a particular end." *See Cellular Telecommunications & Internet Association, et al. v. FCC, 330 F.3d 502, 510 (D.C. Cir. 2003).* The EPA's interpretation of "necessary" is reasonable in the context of CAA section 112(n)(1)(A).

The commenter stated that EPA concedes that the Agency has not "clearly established" that regulation of HAP emissions under CAA section 112 is "indispensible." The EPA has conceded nothing but, more importantly, the supposed standard that the commenter presents for evaluating whether it is necessary to regulate HAP emissions from EGUs is not required by the statute. Even the limited legislative history on which the commenter incorrectly relies does not espouse such a standard. The commenter specifically takes issue with EPA's statement that the Agency may find it is necessary to regulate EGUs under CAA section 112 if we are "uncertain whether imposition of the other requirements of the CAA will sufficiently address the identified hazards." *76 FR at 24990.* The commenter has again misinterpreted the Agency's position by stating that "EPA construes CAA section 112(n)(1)(A) as permitting it to find that it is "necessary" to regulate EGUs even where the Agency does not actually know whether it is "necessary" to regulate EGUs." Instead, the EPA maintains that it may be necessary to regulate EGUs under CAA section 112 if we identify a hazard to public health or the environment that is appropriate to regulate today and our projections into the future do not clearly establish that the imposition of the requirements of the CAA will address the identified hazard in the future. Making a prediction about future emission reductions from a source category is difficult for statutory provisions that do not mandate direct control of the given source category or pollutants of concern. We maintain that erring on the side of caution is appropriate when the protection of public health and the environment from HAP emissions is not assured based on our modeling of future emissions.

Furthermore, as we stated in the preamble to the proposed rule, we believe it would be reasonable to find it appropriate *and* necessary to regulate EGUs under section 112 today based on a determination that HAP emissions from EGUs pose a hazard to public health and the environment without considering future HAP emission reductions. *76 FR 24991, n.14.* We maintain this is reasonable because "Congress could not have contemplated in 1990 that EPA would have failed in 2011 to have regulated HAP emissions from EGU's where hazards to public health and the environment remain." *Id.* The phrase "after imposition of the requirements of [the Act]" as contemplated CAA section 112(n)(1)(A) could be read to apply only to those requirements clearly and directly applicable to EGUs under the 1990 CAA amendments, all of which have been implemented and still hazards to public health and the environment from HAP emissions from EGUs remain.

g. Listing EGUs Under 112

Comment: One commenter stated that even if EPA were to establish under CAA section 112(n)(1)(A) that it is "appropriate and necessary" to regulate HAP emissions from EGUs, regulating those emissions in the form of a MACT standard established pursuant to CAA section 112(d) is contrary to the plain language of the Act. According to the commenter, if EPA proceeds to finalize the proposal and adopts such a standard, the rule will for this reason alone be "dead-on-arrival". According to the commenter, the EPA apparently believes that its only option in regulating EGU HAP emissions is establishing a MACT standard under CAA section 112(d). In the preamble to its proposal, the commenter states that EPA contends that, "once the appropriate and necessary finding is

made," EGUs are then "subject to section 112 in the same manner as other sources of HAP emissions"—*i.e.*, by "listing" EGUs under CAA section 112(c) and adopting a MACT standard under CAA section 112(d). *See 76 FR 24993/2* (emphasis added). The commenter further stated that, given that Congress "directed the Agency to regulate utilities under this section' [*i.e.*, CAA section 112]," EPA continues, it follows that "EGUs should be regulated in the same manner as other categories for which the statute requires regulation." *Id.* (emphasis added). The commenter asserts that as EPA sees it, because "Congress did not exempt EGUs from the other requirements of section 112," once EGUs were "listed" under CAA section 112(c), the Agency was "required to establish emission standards for EGUs consistent with the requirements set forth in section 112(d)." *Id. at 24,993/3* (emphasis added).

The commenter stated that, in support of this reading of the CAA, the EPA invokes the decision of the U.S. Court of Appeals for the D.C. Circuit in *New Jersey v. EPA, 517 F.3d 574 (D.C. Cir. 2008).* The commenter further alleged that, according to EPA, the D.C. Circuit has "already held that section 112(n)(1) governs how the Administrator decides whether to list EGUs.' "*See 76 FR 24993/2-3*, quoting *517 F.3d at 583.* The commenter stated that EPA construes that holding as indicating that, "once listed, EGUs are subject to the requirements of section 112"—including, the EPA presumes, CAA section 112(d). Id. The commenter stated that elsewhere, the EPA construes CAA section 112(n)(1) (A) as "govern[ing] how the Administrator decides whether to list EGUs for regulation under section 112," and quotes the D.C. Circuit's observation in *New Jersey* that "Section 112(n)(1) governs how the Administrator decides

whether to list EGUs; it says nothing about delisting EGUs." *See 76 FR 24981/2*, quoting *517 F.2d at 582.*

The commenter asserts that EPA misinterprets the "under this section" language of CAA section 112(n)(1); overstates the significance of the *New Jersey* decision; and, as a consequence, misapprehends the scope of its own discretion to formulate regulatory standards for EGUs under CAA section 112. In light of these errors, the commenter maintains that EPA should withdraw the proposed MACT rule.

One commenter stated that if Congress had intended that EPA regulate EGU HAP emissions only through a MACT standard, Congress could have—and presumably would have—directed the Agency to regulate EGU emissions "under CAA section 112(d)." Thus, the commenter maintained that EPA's authority to regulate EGU HAP emissions is not derived from any particular subsection of CAA section 112. Rather, the commenter stated that EPA is authorized to regulate "under this section"—*i.e.*, CAA section 112 generally—as may be "appropriate and necessary." The commenter stated that there is nothing on the face of CAA section 112(n)(1)(A) that specifies that regulation of EGUs must occur under CAA section 112(d). To the contrary, according to the commenter, a plain reading of CAA section 112(n)(1)(A), as interpreted based on the Oxley statement, indicates that establishing a MACT standard for EGUs under CAA section 112(d) is not what Congress had in mind at all.

Response: We do not agree with the commenter. The EPA interpreted CAA section 112(n)(1)(A) in a manner that gives meaning to all the words used in the provision. *See NRDC v. EPA, 489 F.3d 1364, 1373 (D.C. Cir. 2007)* (admonishing EPA for an inter-

pretation of CAA section 112(c)(9) that ignored certain words and the context in which they were used. The Court stated that "EPA's interpretation would make the words redundant and one of them mere surplusage,' which is inconsistent with a court's duty to give meaning to each word used by Congress.") (*citing TRW Inc. v. Andrews, 534 U.S. 19, 31, 122 S. Ct. 441, 151 L. Ed. 2d 339 (2001)).* Specifically, in the preamble to the proposed rule, we stated:

> The statute directs the Agency to regulate EGUs under section 112 if the Agency finds such regulation is appropriate and necessary. Once the appropriate and necessary finding is made, EGUs are subject to section 112 in the same manner as other sources of HAP emissions. Section 112(n)(1)(A) provision provides, in part, that: [t]he Administrator shall perform a study of the hazards to public health reasonably anticipated to occur as a result of emissions by electric utility steam generating units of pollutants listed under subsection (b) of this section after imposition of the requirements of this chapter. * * * The Administrator shall regulate electric utility steam generating units *under this section,* if the Administrator finds such regulation is appropriate and necessary after considering the results of the study required *by this subparagraph." Emphasis added.*

In the first sentence, Congress described the study and directed the Agency to evaluate the hazards to public health posed by HAP emissions listed *under subsection* (b) (*i.e.,* CAA section 112(b)). The last sentence requires the Agency to regulate *under this section* (*i.e.,* CAA section 112) if the Agency finds such regulation is appropriate and necessary after

considering the results of the study required by this subparagraph (i.e., CAA section 112(n)(1)(A)). The use of the terms "section", "subsection", and "subparagraph" demonstrates that Congress was consciously distinguishing the various provisions of CAA section 112 in directing the conduct of the study and the manner in which the Agency must regulate EGUs if the Agency finds it appropriate and necessary to do so. Congress directed the Agency to regulate utilities "under this section," and accordingly EGUs should be regulated in the same manner as other categories for which the statute requires regulation. *See 76 FR 24993.*

We maintain that our interpretation of the statute gives meaning to all the words, and the commenter's interpretation does not give any particular meaning to the requirement to "regulate under this section [112]". The commenter is correct that Congress could have in CAA section 112(n)(1)(A) directed EPA to regulate HAP from EGUs under CAA section 112(d) after making the appropriate and necessary finding, but the commenter presumes too much when it stated that Congress would have directed the Agency to regulate HAP emissions from EGUs in such a manner if that is what Congress wanted, simply by including the phrase "regulate under this paragraph" or "regulate under this subparagraph" instead of directing the Agency to "regulate under this section". It did not do so.

As we explained in the section II.A. of the proposed rule, CAA section 112 establishes a mechanism to list and regulate stationary sources of HAP emissions. *76 FR 24980-81.* Regulation under CAA section 112 generally requires listing under CAA section 112(c), regulation under CAA section 112(d), and, for sources

subjected to MACT standards, residual risk regulations under CAA section 112(f) (as necessary to protect human health and the environment with an ample margin of safety). A determination that EGUs should be listed once the prerequisite appropriate and necessary finding is made is wholly consistent with the language of section 112(n)(1)(A), and listed sources must be regulated under CAA section 112(d). *See* CAA section 112(c)(2); *see also New Jersey, 517 F.3d at 583* (112(n)(1)(A) "governs how the Administrator decides whether to list EGUs").

As noted above, Congress used the terms section, subsection, and subparagraph in section 112(n)(1)(A). The use of these three terms demonstrates that Congress was consciously distinguishing between the various provisions of section 112. Congress directed the Agency to regulate utilities "under this section," and accordingly EGUs should be regulated in the same manner as other categories for which the statute requires regulation.

Furthermore, the flaws in the commenter's interpretation are highlighted by other CAA section 112 provisions wherein Congress provided specific direction as to the manner of regulation. For example, CAA section 112(m)(6) requires the Administrator to determine "whether the other provisions of *this section* [112] are adequate" and also indicates that "[a]ny requirements promulgated pursuant to this *paragraph* * * * shall only apply to the coastal waters of the States which are subject to [section 328 of the CAA]." (*emphasis added*).

In addition, CAA section 112(n)(3) provides that when the Agency is "promulgating any standard under this section [112] applicable to publicly owned treatment works, the Administrator may provide for

control measures that include pretreatment of discharges causing emissions of hazardous air pollutants and process or product substitutions or limitations that may be effective in reducing such emissions." Finally, CAA section 112(n)(5) directs the Agency to assess hydrogen sulfide emissions from oil and gas extraction and "develop and implement a control strategy for emissions of hydrogen sulfide to protect human health and the environment * * * *using authorities under [the CAA] including [section 111] of this title and this section [112]." (emphasis added).* We believe these provisions provide ample evidence that Congress knew how to alter or caveat regulation under CAA section 112 when that was its intent. For these reasons, we believe commenter's argument is without merit.

Comment: Two commenters stated that CAA section 112(n)(1)(A) does not specify that regulation of EGUs must proceed under CAA section 112(d). According to the commenter, an argument could be made, therefore, that the CAA accords EPA with the discretion to regulate EGUs using strategies other than emission standards in CAA section 112(d). The commenters also state that section 112(n)(1)(A) of the CAA requires that EPA "develop and describe" alternative control strategies for emissions which may warrant regulation under CAA section 112. According to the commenters if Congress meant for EPA to have one sole regulatory option, i.e., regulation of EGUs only under CAA section 112(d), then the development of alternative control strategies would be rendered meaningless because under CAA section 112(d)(3), the EPA is required to determine the level of control that is achieved by the best performing existing units for which it has data and then to impose that level of control on all existing units. The commenter further

states that the development of "alternative control strategies" has no role to play in this process. One commenter does note that the consideration of "alternative" controls becomes relevant, if at all, only in those circumstances where EPA might seek to establish a "Beyond-the-Floor" MACT standard pursuant to CAA section 112(d)(2).

Response: The commenters are correct that CAA section 112(n)(1)(A) directed the Agency to develop and describe in the Utility Study report to Congress alternative control strategies for HAP emissions from EGUs that may warrant regulation in the Utility Study, but the commenters' interpretation of and conclusion based on that language are both factually and legally inaccurate.

The commenters appear to interpret the word "alternative control strategies" to mean something other than the traditional control technologies and control measures that are used to control HAP emissions from EGUs. We do not believe that is a reasonable interpretation of the statute, and the Agency did not interpret the statute in that manner when it conducted the Utility Study. In Chapter 13 of the Utility Study, the EPA considered a range of control measures that would reduce the different types of HAP emitted from EGUs. *http://www.epa.gov/ttn/atw/combust/utiltox/eurtc1.pdf.* The EPA considered pre-combustion controls such as coal washing, fuel switching, and gasification; combustion controls such as boiler design; post-combustion controls such as fabric filters, scrubbers, and carbon absorption; and alternative controls strategies such as demand-side management, energy conservation, and use of alternative fuels (*e.g.*, biomass) or renewable energy. The options discussed in the Utility Study for

controlling HAP emissions from EGUs are almost universally available to comply with a CAA section 112(d) standard.

Given the manner in which the Agency conducted the Utility Study, the EPA interpreted the statutory direction as a requirement to set forth the potential alternative control options available to EGUs to comply with CAA section 112 standards in the event the Agency determined regulation under section 112 was appropriate and necessary. The EPA's development and discussion in the Utility Study of alternative control strategies for complying with the standards would help prepare EGUs to comply with the standards if promulgated. Thus, the EPA interpreted the direction to address control strategies in the Utility Study as a request to identify the controls available to EGUs for addressing HAP emissions, and such information would, of course, be relevant if EPA determined that such emissions warranted regulation under section 112.

Furthermore, the EPA establishes CAA section 112(d) standards for stationary sources and it is the responsibility of the sources to comply with the standards using any mechanism available, including pre-combustion and post-combustion measures. Also, the establishment of a MACT standard under CAA section 112(d)(2) and (3) is a two-step process. In the first step, the Agency establishes a floor based on the performance of the best controlled unit or units. *See* CAA section 112(d)(3). In the second step, the Agency must consider additional measures that may reduce HAP emissions and adopt such measures if reasonable after considering costs and non-air quality health and environmental effects. *See* CAA section 112(d)(2). Under the second step, the Agency can consider any

measure that reduces HAP emissions even if no source in the category is employing the option under consideration. So, even under the commenter's flawed interpretation of "alternative control strategies", the direction in CAA section 112(n)(1)(A) is not a "pointless exercise" for the development of CAA section 112(d) standards as the Agency considers relevant technologies and HAP emission reduction approaches in evaluating whether to set a more stringent beyond the floor standard.

Comment: One commenter points to CAA section 307(d)(1)(C) and notes that CAA section 112(n) is listed among the provision for which the rulemaking requirements of CAA 307(d) apply. Commenter maintains that this inclusion creates an expectation under the statute that EPA may establish regulatory standards under CAA 112(n). The commenter points to CAA sections 112 (n)(1), (n)(3), and (n)(5) and states that those provisions specifically discuss regulation under CAA section 112 and that EPA must explain why CAA 307(d)(1)(C) states "any regulation under" CAA 112(n) to defend regulation of utilities under section 112(d). The commenter then implies that EPA erred by not even mentioning this provision at proposal.

The commenter also takes issue with EPA's statement in the proposed rule that "use of the terms section, subsection, and subparagraph" "demonstrates that Congress was consciously distinguishing the various provisions of section 112 in directing the conduct of the study and the manner in which the Agency must regulate EGUs," if EPA determines that it is appropriate and necessary to regulate EGUs. See *76 FR at 24,993/2*.

One commenter does not agree with the EPA's finding that the word "subsection" in the first sentence of CAA section 112(n)(1)(A) demonstrates that Congress was consciously distinguishing between the various provisions of CAA section 112 in directing the conduct of the study and the manner in which the Agency must regulate EGUs," were the EPA to "find[] it appropriate and necessary to do so." *See 76 FR 24993/2.* According to the commenter, the only evident reason that the word "subsection" is used in the first sentence of CAA section 112(n)(1)(A) is because the reference is made to the "pollutants" which the Utility Study is to address—*i.e.*, the "pollutants" that are emitted by EGUs and which are "listed under subsection (b)" of CAA section 112. Similarly, the word "subparagraph" is used in the last sentence of CAA section 112(n)(1)(A) to identify "the study" which the EPA is directed to undertake by subparagraph (A) of CAA section 112(n)(1)—*i.e.*, the Utility Study. That the last sentence of subparagraph (n)(1)(A) also states that EPA "shall regulate electric utility steam generating units under this section" does not even imply—much less expressly communicate—that regulation "under this section" must mean "regulation under section 112(d)." The commenter stated that Congress was "consciously distinguishing" between the "various provisions of section 112" for the sake of clarity in the drafting of CAA section 112(n).

The commenter also asserts that the EPA mistakenly relies on section 112(c)(6) when the EPA states that " where Congress wished to exempt EGUs from specific requirements of section 112, it said so explicitly. Congress did not exempt EGUs from the other requirements of section 112,' " and thus the Agency is " required to establish emission standards for EGUs consistent with the requirements set forth in

section 112(d)' " (citing *76 FR at 24,993* (internal quotation omitted)).

According to the commenter, nothing in section 112(c)(6) indicates how (or even whether) EGU HAP emissions should be regulated under section 112; paragraph (c)(6) serves only to reiterate that the regulation of such emissions is to occur (if at all) as is provided by section 112(n)(1). The commenter also asserts that the EPA mistakenly relies on *New Jersey*. According to the commenter, the D.C. Circuit in that case did not indicate that the language of section 112(c)(6) should, or could, be construed to mean that EGUs must be regulated under a MACT standard adopted pursuant to section 112(d).

Response: The commenter makes a number of arguments that appear to take issue with the EPA's determination that EGUs should be regulated under CAA section 112(d) if the Agency determines that regulation of HAP emissions from such units is appropriate and necessary. The commenter implies that the EPA erred because alternative mechanisms for regulation of EGUs under CAA section 112 might exist. We do not agree.

The commenter's argument that the EPA erred because we did not explain why section CAA section 307(d)(1)(C) contemplates regulations under CAA section 112(n) is without merit. It is correct that the Agency believes EGUs should be regulated in the same manner as other sources if the appropriate and necessary finding is made because of the structure of CAA section 112. Nothing in CAA section 112(n)(1) requires or implies that the Agency should or must establish standards for EGUs under that provision. Furthermore, unlike CAA sections 112(n)(3) and 112(n)(5) that commenter cites, CAA section

112(n)(1)(A) does not provide any guidance concerning the manner in which EPA is authorized or required to regulate sources under CAA section 112. *See* CAA section 112(n)(3) (specifically authorizing identified control measures and other requirements for consideration in issuing standards under CAA section 112); see also CAA section 112(n)(5) (directing the Agency to develop and implement a control strategy for emissions of hydrogen sulfide using any authority available under the CAA, including sections 112 and 111, if regulation is appropriate). For these reasons, we disagree that any error occurred because we did not specifically discuss in this proposed rule whether we could or should regulate EGUs under CAA section 112(n)(1) instead of CAA section 112(d).[63] The Agency validly listed EGUs in 2000 and listed sources must be regulated pursuant to CAA section 112(d).

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Even if we agreed that regulation under CAA section 112(n)(1) was a viable option for EGUs, we would still have listed and regulated EGUs like other sources because CAA section 112(d) provides a statutory framework for regulating HAP emissions from

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[63] We note that in our January 2004 proposed rule, we solicited comment on whether section 112(n)(1)(A) provided independent authority to regulate EGUs. We received several comments on this issue, and we rejected the concept after reviewing the comments and further considering the language of section 112(n)(1)(A) and the structure of section 112. As such, we proposed and are finalizing that once the Agency determines that it is appropriate and necessary to regulate EGUs under section 112, those sources are listed pursuant to subsection 112(c), as we did in December 2000, and the Agency must set standards for those sources pursuant to section 112(d). See section 112(c) and (d)(1) (requiring establishment of 112(d) standards for listed source categories).

sources and CAA section 112(n)(1) does not. We believe that even if CAA section 112(n)(1) were available to regulate EGUs, there would be sufficient uncertainty about the legal vulnerability of such an approach to caution against employing it. This legal uncertainty would be particularly troubling in light of the fact that we have identified hazards to public health and the environment from HAP emissions from EGUs that warrant regulation, and these regulations are long overdue.

The commenter also takes issue with our statement in the preamble to the proposed rule that the use of the words "section", "subsection", and "subparagraph" in CAA section 112(n)(1)(A) "demonstrates that Congress was consciously distinguishing the various provisions of section 112 in directing the conduct of the study and the manner in which the Agency must regulate EGUs." *See 76 FR 24993.* The commenter appears to make much of our use of the word "must" in that sentence and also states that our interpretation of the significance of the use of the three terms in CAA section 112(n)(1)(A) is flawed because Congress only used the three terms for purposes of clarity. The commenter is incorrect on both points. With respect to the commenter's concern regarding the use of the word "must" in the sentence quoted above, we note that in the next sentence we stated that "Congress directed the Agency to regulate utilities under this section,' and accordingly EGUs *should* be regulated in the same manner as other categories for which the statute requires regulation." *Id.* (*emphasis added*). We were not foreclosing the possibility of any alternative interpretation and our use of the term "must" should not detract from the point we were trying to make. Specifically, we believe that Congress would have directed us to regulate EGUs under CAA

section 112(n)(1)(A) if that was its intent and, absent that mandate, the better reading of the statute is the one provided in the preamble to the proposed rule, which is that EGUs should be listed pursuant to CAA section 112(c) and subject to CAA section 112(d) emission standards.

The commenter also stated that the EPA relied on CAA section 112(c)(6) to support a conclusion that EGUs must be regulated under CAA section 112(d). The commenter takes the EPA's statements out of context. The statement in whole read:

> Furthermore, the D.C. Circuit Court has already held that section 112(n)(1) "governs how the Administrator decides whether to list EGUs" and that once listed, EGUs are subject to the requirements of CAA section 112. *New Jersey, 517 F.3d at 583.* Indeed, the D.C. Circuit Court expressly noted that "where Congress wished to exempt EGUs from specific requirements of section 112, it said so explicitly," noting that "section 112(c)(6) expressly exempts EGUs from the strict deadlines imposed on other sources of certain pollutants." *Id.* Congress did not exempt EGUs from the other requirements of CAA section 112, and once listed, EPA is required to establish emission standards for EGUs consistent with the requirements set forth in CAA section 112(d), as described below. *See 76 FR 24993.*

As can be seen from this passage, the Court cited section 112(c)(6) as an example of Congress' intent regarding regulating EGUs under CAA section 112. The commenter cited the last clause of the last sentence of the paragraph quoted above without including the prefatory clause "once listed," and, without that clause, the statement is not fairly char-

actèrized. The point the EPA was making in that paragraph is that EGUs are a listed source category and listed sources must be regulated under CAA section 112(d) unless the EPA delists the source category.

Comment: One commenter stated that EPA overstates the significance of the D.C. Circuit's holding in *New Jersey* by suggesting that the decision mandates EGU regulation under CAA section 112(d) because EGUs "remain listed" under CAA section 112(c), *See New Jersey, 517 F.3d at 582.* According to the commenter, the court declined to address the lawfulness of EPA's having "listed" EGUs under CAA section 112(c), leaving that matter to be decided if and when EPA adopted standards for EGUs under CAA section 112. Nowhere in the decision did the D.C. Circuit indicate that EPA must regulate EGUs under CAA section 112(d).

According to the commenter, the EPA must consider both whether the regulation of EGUs is "appropriate and necessary" under section 112(n)(1) and address anew whether the Agency is authorized by section 112 to list EGUs under section 112(c) at all. The commenter asserts that on the face of the proposal, the EPA has not revisited the question whether the "listing" of EGUs under section 112(c) is consistent with congressional intent.

Response: The commenter's arguments are circular and it is difficult to fully determine exactly what its issue is with EPA's listing; however, it appears that the commenter believes that EPA incorrectly relied on the *New Jersey* decision to justify the listing of EGUs. The commenter also appears to argue that the Agency has never explained why it has the authority to list EGUs at all. We disagree.

As stated in the preamble to the proposed rule, CAA section 112(n)(1)(A) requires EPA to conduct a study of HAP emissions from EGUs and regulate EGUs under CAA section 112 if we determine that regulation is appropriate and necessary, after con-sidering the results of the study. *76 FR 24981, 24986, and 24998.* The only condition precedent to regulating EGUs under CAA section 112 is a finding that such regulation is appropriate and necessary (after conducting and considering the Utility Study), and once that finding is made the Agency has the authority to list EGUs under CAA section 112(c) as the first step in the process of establishing regulations under section 112. The D.C. Circuit agrees with that interpretation of the statute as evidenced by its statement in *New Jersey* that "section 112(n)(1)(A) governs how the Administrator decides whether to list EGUs for regulation under section 112," *517 F.3d at 582,* and the Court's statement directly contradicts the commenter's position.

The EPA did not rely on the *New Jersey* decision to justify the appropriate and necessary finding as the commenter suggests. We based the finding in 2000 on the extensive information available to the Agency at the time, and we confirmed the finding in the preamble to the proposed rule based on new information. The commenter had ample opportunity to comment on the appropriate and necessary finding, and it may challenge the basis of the listing (*i.e.* the appropriate and necessary finding) when EPA issues the final standards.

Comment: One commenter believes that the D.C. Circuit will condemn the final rule as a result of EPA's "misapprehension" that upon making an "appropriate and necessary" finding, the Agency is compelled by the

CAA to adopt a regulatory standard for EGUs under CAA section 112(d). According to the commenter, a regulation will be invalid if the regulation " was not based on the [agency's] own judgment' " but " rather on the unjustified assumption that it was Congress' judgment that such [a regulation] is desirable' or required." *See Transitional Hospitals Corp.* v. *Shalala, 222 F.3d 1019, 1029 (D.C. Cir. 2000),* quoting *Prill v.NLRB, 755 F.2d 941, 948 (D.C. Cir. 1985).* The commenter further notes that the D.C. Circuit has held that, where an agency wrongly construes a judicial decision as compelling a particular statutory interpretation, and thereby unduly limits the scope of its own discretion, the agency's action cannot be sustained. *See, e.g., Phillips Petroleum Co. v. FERC, 792 F.2d 1165, 1171 (D.C. Cir. 1986).* The commenter believes the rule is bound to be rejected and that the EPA should "reconsider the legal interpretations on which it purports to base its rule."

Response: We do not agree that we have improperly interpreted the statute as limiting our discretion in the manner suggested by the commenter. The commenter makes only one specific allegation in this comment and that concerns the Agency's conclusion that it must establish CAA section 112(d) standards for EGUs in light of the *New Jersey* decision. The commenter does not explain why that conclusion is incorrect. As we state above and in the preamble to the proposed rule, because EGUs are a CAA section 112(c) listed source category, the Agency must establish CAA section 112(d) standards or delist EGUs pursuant to CAA section 112(c)(9). *See New Jersey, 517 F.3d at 582-83* (holding that EGUs remain listed under section 112(c)); *see also* CAA section 112(c)(2) (requiring the Agency to "establish emission standards under subsection [112] (d)" for listed source categories

and subcategories); *76 FR 24998-99*. We concluded in the preamble to the proposed rule that we could not delist EGUs because our appropriate and necessary analysis showed that EGUs did not satisfy the CAA section 112(c)(9)(B)(i) delisting criteria. *Id.* We did not address in the preamble to the proposed rule whether EGUs satisfied the CAA section 112(c)(9)(B)(ii) criteria because EGUs failed the first prong of the delisting provisions. *Id.* We reach the same conclusion in the final rule and also address the delisting petition submitted by this commenter. Because we cannot delist EGUs, we must regulate them under CAA section 112(d). The commenter has provided no legitimate argument to rebut this conclusion. *See also* previous responses regarding regulation under section 112(n)(1)(A).

Comment: One commenter alleges that EPA impermissibly relied on CAA section 112(c)(9) to interpret "hazards to public health", and argues that the "residual risk" provisions in CAA section 112(f)(2) are more appropriate for the establishment of standards for EGUs. The commenter stated that by using CAA section 112(c)(9)(B)(i) in defining "hazards to public health", the Agency has seized on the one interpretation of the phrase that is surely contrary to congressional intent and, thus, falls outside the permissible range of its interpretative discretion. The commenter maintains that the "delisting" criteria of CAA section 112(c)(9) are simply irrelevant to the decision whether EGU HAP emissions will present any "hazards to public health" sufficient to warrant regulation of those emissions under CAA section 112.

The commenter also argues that Congress intended that EGUs be treated differently from all other "major sources" to which the "delisting" provisions of CAA

section 112(c)(9), and the standard-setting provisions of CAA section 112(d) necessarily and automatically apply. Therefore, according to the commenter, the EPA's proposal to utilize the criteria of CAA section 112(c)(9) to inform its findings under CAA section 112(n)(1)(A) treats EGUs exactly the same as all other major source categories, is contrary to congressional intent, and thus unlawful. The commenter goes on to state that in exercising its discretion to define "hazards to public health" as the phrase is used in CAA section 112(n)(1)(A), the EPA would be better served to consider the "residual health risk" provisions of CAA section 112(f)(2). Those provisions provide a better analogy to the establishment of standards for EGUs under CAA section 112 than do the "de-listing" criteria of CAA section 112(c)(9).

The commenter believes the category-specific criteria of paragraph (c)(9) are a poor fit for an evaluation of "hazards to public health" that should reasonably include such factors as the affected population, the characteristics of exposure, the nature of the health effects, and the uncertainties associated with the data. The commenter states that, while CAA section 112(n)(1)(A) does not expressly include any requirement that EGU emissions be regulated with an "ample margin of safety," that standard is more appropriate than the "one-in-a-million" cancer risk standard of CAA section 112(c)(9)(B)(i) that EPA proposes to employ.

Response: The commenter acknowledges that EPA has broad discretion to interpret the phrase "hazard to public health" but argues that the one thing we cannot do is use the CAA section 112(c)(9)(B) delisting provisions as a benchmark in making that interpretation. The commenter asserts that the use of the

delisting standard is clearly contrary to Congressional intent but it does not provide any substantive rebuttal to our conclusion that the CAA section 112(c)(9) standards reflects the level of hazard which Congress concluded warranted continued regulation. Instead, the commenter reverted to its argument that the statute treated EGUs differently. The EPA views the disparate treatment of EGUs in a different light than commenter. While it is true that Congress established a different statutory provision governing whether to add EGUs as a regulated source category under section 112, we do not interpret CAA section 112(n)(1)(A) as providing Congressional license to ignore risks that Congress determined warranted regulation for all other source categories. Because CAA section 112(c)(9) defines that level of risk, it is reasonable to consider it when evaluating whether EGU HAP emissions pose hazards to public health.

The commenter also suggests that the "ample margin of safety standard" of CAA section 112(f)(2) is a better fit than the one-in-a-million standard set forth in CAA section 112(c)(9)(B)(1) for evaluating hazards to public health. The commenter asserts that an evaluation of "hazards to public health" should include such factors as the affected population, the characteristics of exposure, the nature of the health effects, and the uncertainties associated with the data. However, the EPA did not rely solely on the delisting provisions for evaluating hazards to public health as commenter suggests. In fact, the EPA considered all of the factors the commenter suggests in making our finding.[64] Thus, we decline to adjust our approach to

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[64] *76 FR 24992.*

evaluating hazards to public health and the environment based on the comments.

h. 2000 Finding (and 2005 Delisting)

Comment: Several commenters generally support EPA's 2000 finding that regulating HAP emissions from EGUs under CAA section 112 is "appropriate and necessary." According to the commenters, the 2000 finding was proper under the CAA and within EPA's discretion, well-supported based on sound science available to the Agency at the time on the harm from HAP emitted by EGUs, and no additional information makes the finding invalid. Several commenters cited the conclusions of the Utility Study[65] and Mercury Study,[66] which they assert supported the finding and satisfied the only prerequisite for the finding. One commenter specifically asserted that the 2000 finding was well-supported by the Utility Study's conclusions that (1) there was a link between anthropogenic Hg emissions and MeHg found in freshwater fish, (2) Hg emissions from coal-fired utilities were expected to worsen by 2010, and (3) MeHg in fish presents a threat to public health from fish consumption. One commenter noted that the CAA does not require a conclusive link between HAP emissions and harm. One commenter stated that the CAA grants the Administrator discretion in her finding, and that discretionary decision should not be overly scrutinized, citing court opinion.[67] In support of the finding,

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[65] U.S. EPA 1998. Study of Hazardous Air Pollutant Emissions from Electric Utility Steam Generating Units—Final Report to Congress. EPA-453/R-98-004a. February.

[66] U.S. EPA, 1997.

[67] "Where a statute is precautionary in nature, the evidence difficult to come by, uncertain, or conflicting because it is on the frontiers of scientific knowledge, the regulations designed to

one commenter stated that it would not make sense for Congress to limit HAP emissions from small businesses such as dry cleaners but to exempt U.S. EGUs, which are the largest sources of many HAP emissions. One commenter agreed that finding was further supported because numerous control options were available to reduce HAP emissions. One commenter agreed with the 2000 finding that the Agency lacked sufficient evidence to conclude that non-Hg HAP from EGUs posed no hazard.

The commenters who generally supported the 2000 finding also commented on specific aspects of the finding. Several commenters asserted that while the evidence on Hg alone supports the finding, the potential harm from non-Hg HAP further supported the 2000 finding. Several commenters noted that new science continues to support the 2000 finding. Several commenters also stated that the "appropriate" finding was further supported because numerous control options were available at the time of the finding that would reduce HAP emissions. One commenter concurred with EPA that regulating natural gas-fired EGUs was not appropriate and necessary because the impacts due to HAP emissions from such units are negligible based on the results of the Utility Study.

Several commenters addressed the 2005 reversal of the 2000 finding. Several commenters specifically supported the vacatur of the 2005 action. Other commenters asserted that the 2005 action was proper, and that EPA reverted back to the 2000 finding in the

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protect the public health, and the decision that of an expert administrator, [courts] will not demand rigorous step-by-step proof of cause and effect." *Ethyl Corp. v. EPA, 541 F.2d 1, 28 (Ct. App. D.C. Circ. 1978).*

proposed rule without adequate explanation or support. Several commenters cited the 2005 action as invalidating the 2000 finding, specifically noting that EPA concluded that "no hazards to public health" remained after accounting for emission reductions under CAIR. These commenters assert that EPA's current position is illegal because EPA took the exact opposite position on the interpretation of the term "necessary" in its 2005 reversal, and, thus, deserves no judicial deference. One commenter stated that in 2005 EPA recognized the potential for excessive regulation created by CAA section 112 and determined that the 2000 finding lacked foundation.

Several commenters generally disagreed with the 2000 finding, with two commenters stating that EPA did not have a rational justification for it and another claiming that it was fraught with misinformation and overestimating assumptions. One commenter claimed that EPA did not explain the terms "appropriate" and "necessary" in the 2000 finding and that the emission control analysis was inadequate. Two commenters stated that the 2000 finding was based on data that was more than 10 years old, which causes serious concern regarding the validity of the findings because technology, the regulatory environment, and the economic climate have evolved. Furthermore, because the Utility Report underestimated emissions controls that EGUs would install by 2010 and additional controls that would be later required by the CSAPR, the basis for EPA's 2000 finding has changed. Several commenters stated that a "plausible link" between anthropogenic Hg and MeHg in fish is not an adequate reason for the 2000 finding. Several commenters claim that EPA only identified health concerns for Hg (and potentially Ni) but not other HAP from coal-fired EGUs in the 2000 finding, and, thus, cannot regulate

HAP other than Hg because the 2000 finding authorizes only the regulation of Hg. One commenter questioned the Hg emissions underlying the 2000 finding, specifically the fraction of total deposition attributable to U.S. EGUS and the fact that EPA projected an increase in U.S. EGU emissions from 1990 to 2010 though emissions actually declined.

Several commenters raised procedural issues related to the 2000 finding. Several commenters stated that the 2000 finding failed to provide public notice and comment. According to the commenters, the CAA requires that any decision made under CAA section 112(n) must go through public notice and comment. The commenters further stated that the failure to provide public notice and comment means that this MACT is outside EPA's statutory authority. One commenter stated that because the 2000 finding was never "fully ventilated" in front of the D.C. Circuit, the EPA's authority to regulate EGUs under CAA section 112(d) is directly at issue. The commenters claim that specific issues did not undergo public notice and comment, including least-cost regulatory options, the impact of regulation on electricity reliability, and EPA's interpretation of the requirements under CAA section 112(n)(1)(A). One commenter claims that EPA attempted to provide after-the-fact support for its 2000 finding with new legal analysis and new factual information, contrary to *New Jersey* v. *EPA* that held that EPA may not revisit its 2000 finding except through delisting under CAA section 112(c)(9). One commenter stated that EPA's 2000 finding should be reviewed when EPA

issues the actual NESHAP.[68] One commenter stated that the 2000 finding ignored EO 12866.

Response: EPA agrees with the commenters that the 2000 finding was reasonable and disagrees with the commenters asserting that the 2000 finding was unreasonable or failed to follow proper procedural requirements.

The EPA agrees that reviewing courts defer to the reasoned scientific and technical decisions of an Agency charged with implementing complex statutory provisions such as those at issue in this case. As EPA stated in the preamble to the proposed rule, the EPA maintains that the 2000 finding was reasonable and based on well-supported evidence available at the time, including the Utility Study, the Mercury Study,[69] and the NAS study,[70] which all showed the hazards to public health and the environment from HAP emitted from EGUs. New technical analyses conducted by EPA confirm that it remains appropriate and necessary to regulate HAP emissions from EGUs. Furthermore, the EPA agrees with the commenters on several points raised, specifically that EGUs were and remain the largest anthropogenic source of several HAP in the U.S., that risk assessments supporting the 2000 finding indicated potential concern for several non-Hg HAP, and that several available control options would effectively reduce HAP emissions from U.S. EGUs.

The EPA agrees with the commenters that Congress did not exempt EGUs from section 112(d) HAP

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[68] *See UARG v. EPA, 2001 WL 936363,* No. 01-1074 (D.C. Cir. July 26, 2001).

[69] U.S. EPA, 1997.

[70] NAS, 2000.

emission limits while simultaneously limiting emissions at other sources with less HAP emissions. Congress simply provided EPA with a separate path for listing EGUs by requiring that the Agency evaluate HAP emissions from EGUs and determine whether regulation under CAA section 112 was appropriate and necessary. Since 1990, the EPA has promulgated regulations requiring the use of available control technology and other practices to reduce HAP emissions for more than 170 source categories. U.S. EGUs are the most significant source of HAP in the country that remains unaddressed by Congress's air toxics program. The EPA listed EGUs in 2000 because the considerable amount of available data supported the conclusion that regulation of EGUs under CAA section 112 was appropriate and necessary. That finding was valid at the time, and EPA reasonably added EGUs to the CAA section 112(c) list of sources that must be regulated under CAA section 112.

The EPA acknowledges that we did not expressly define the terms appropriate and necessary in the 2000 finding, but the finding is instructive in that it shows that EPA considered whether HAP emissions from EGUs posed a hazard to public health and the environment and whether there were control strategies available to reduce HAP emissions from EGUs when determining whether it was appropriate to regulated EGUs.[71] When concluding it was necessary, the Agency stated that imposition of the requirements of the Act would not address the identified hazards to public health or environment from HAP emissions and that section 112 was the

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[71] *65 FR 79830.*

proper authority to address HAP emissions.[72] The EPA explained in the preamble to the proposed rule its conclusion that the 2000 finding was fully supported by the information available at the time,[73] and EPA stands by the conclusions in that notice. Furthermore, the EPA provided an interpretation of the terms appropriate and necessary that is wholly consistent with the 2000 finding. The EPA does not agree with the commenters that a quantification of emissions reductions or a specific identification of the available controls was necessary to support the 2000 finding and listing. The EPA considered the Utility Study when making the finding, and that study clearly articulated the various alternative control strategies that EGUs could employ to control HAP emissions.[74] As to emission reductions, the EPA cannot estimate the level of HAP emission reductions until the Agency proposes a CAA section 112(d) standard after a source category is listed.

The EPA disagrees with commenters that suggest it was not "rational" to determine that it was appropriate to regulate HAP emissions from EGUs due to the cancer risks identified in the Utility Study or the potential concerns associated with other HAP emissions from EGUs. Nothing in CAA section 112(n)(1)(A) suggests that EPA must determine that every HAP emitted by EGUs poses a hazard to public health or the environment before EPA can find it appropriate to regulate EGUs under CAA section 112. In fact, the EPA maintains that it must find it appropriate and necessary to regulate EGUs under

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[72] *Id.*

[73] *65 FR 24994-24996.*

[74] *See* Chapter 13 of the Utility Study (U.S. EPA, 1998).

CAA section 112 if it determines that any one HAP emitted from EGUs poses a hazard to public health or the environment that will not be addressed through imposition of the requirements of the Act. The EPA disputes the commenters' conclusion that the 2000 finding was limited to Hg and Ni emissions, but, even if it were, the EPA reasonably concluded that EGUs should be listed pursuant to CAA section 112(c) based on the Hg and Ni finding. As stated in the 2000 finding, cancer risks from some non-Hg metal HAP (including As, Cr, Ni, and Cd) were not low enough to be to eliminate as potential concern.[75] Source categories listed for regulation under CAA section 112(c) must be regulated under CAA section 112(d), and the D.C. Circuit has stated that EPA has a "clear statutory obligation to set emission standards for each listed HAP". *See Sierra Club v. EPA, 479 F.3d 875, 883 (D.C. Cir. 2007), quoting National Lime Association v. EPA, 233 F.3d 625, 634 (D.C. Cir. 2000).* Therefore, even if EPA concluded that CAA section 112(n)(1) authorized a different approach for regulating HAP emissions from EGUs, the chosen course which is supported by the CAA (*i.e.*, listing under CAA section 112(c)) requires the Agency to regulate under CAA section 112(d) consistent with the statute and case law interpreting that provision.

The EPA disagrees that there is any concern regarding the validity of the 2000 finding or that the emissions information provided in the 2000 finding makes the finding "questionable" as stated by some of the commenters. The EPA maintains that the 2000 finding was sound and fully supported by the record available at the time, including the future year

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[75] *76 FR 79827.*

emissions projections. Therefore, the listing of EGUs is valid based on that finding alone. Even though Hg emissions have decreased since the 2000 finding instead of increasing as projected, the new technical analyses confirm that Hg emissions from EGUs continue to pose hazards to public health and the environment. The EPA also indicated potential concern for several non-Hg HAP in the 2000 finding. It is well established that even small amounts of HAP can cause significant harm to human health and the environment.

The EPA agrees with the commenters who assert that the 2005 action was in error and disagrees with the commenters that the 2005 action invalidated the 2000 finding. As fully described in the preamble to the proposal, the EPA erred in the 2005 action by concluding that the 2000 finding lacked foundation. The 2005 action improperly conflated the "appropriate" and "necessary" analyses by addressing the "after imposition of the requirements of the Act" in the appropriate finding as well as the necessary finding. The EPA also indicated that it was not reasonable to interpret the necessary prong of the finding as a requirement to scour the CAA for alternative authorities to regulate HAP emissions from stationary sources, including EGUs, when Congress provided section 112 for that purpose. The EPA asserts that the 2000 finding was sound and fully supported by the record available at the time for all the reasons stated in this final rule and the proposed rule. The 2005 action interpreted the statute in a manner inconsistent with the 2000 finding and attempted to delist EGUs without complying with the mandates of CAA section 112(c)(9)(B). *See New Jersey, 517 F.3d at 583* (vacating the 2005 "delisting" action). In the preamble to the proposed rule, the EPA set forth

a revised interpretation of CAA section 112(n)(1) that is consistent with the statute and the 2000 finding. The EPA also explained in the preamble to the proposed rule why the 2005 action was not technically or scientifically sound. The EPA specifically addressed the errors associated with the 2005 action in the preamble to the proposed rule, and commenters' assertions do not cause us to revisit these issues. The commenter is also incorrect in suggesting that a change in interpretation is per se invalid and provided no support for that position. *See National Cable & Telecommunications Ass'n, et al., v. Brand X Internet Services, et al., 545 U.S. 967, 981* (discussing the deference provided to an Agency changing interpretations, the Court stated "change is not invalidating, since the whole point of *Chevron* deference is to leave the discretion provided by ambiguities of a statute with the implementing Agency.") (Internal citations and quotations omitted).

The EPA disagrees with the commenters who raise concerns about the validity of the 2000 finding because the data on which that finding was based were more than 10 years old. The EPA made the finding at that time based on the scientific and technical information available, and the finding is wholly supported by that information. In addition, even though not required to do so, the EPA has since conducted new technical analyses utilizing the best information available in 2010 as several years have passed since the 2000 finding. These new analyses confirm that HAP emissions from EGUs continue to pose a hazard to public health and the environment, even after taking into account emission reductions that have occurred since 2000 from promulgated rules, settlements, and consent decrees. *See 76 FR 24991.*

Contrary to the commenter's assertion, the EPA did not violate CAA section 307(d) by not providing a notice and comment opportunity before making the December 2000 appropriate and necessary finding. One commenter challenged EPA's 2000 finding and listing on the same grounds, and the D.C. Circuit dismissed the case because CAA section 112(e)(4) clearly states that listing decisions cannot be challenged until the Agency issues final emission standards for the listed source category. *See UARG v. EPA, 2001 WL 936363,* No. 01-1074 (D.C. Cir. July 26, 2001). The EPA has provided the public an opportunity to comment on both the 2000 finding and the 2011 analyses that support the appropriate and necessary determination as part of the proposed rule, and anyone may challenge the listing in the D.C. Circuit in conjunction with a challenge to this final rule. The commenters could have also commented on the CAA section 112(n)(1) (*e.g.*, the Utility Study and the Mercury Study) studies in 2000 as they were included in the docket, but EPA is not aware of any comments on those studies. In any case, these studies were peer reviewed and considered the best information available at that time. The EPA has fully complied with the rulemaking requirements of CAA section 307(d).

The EPA also disagrees with the commenters' characterization of the *New Jersey* case. The D.C. Circuit did not say, as one commenter suggested, that EPA is not able to consider additional information that is collected after the 2000 finding; instead, the Court stated that EPA could not revise its appropriate and necessary finding and remove EGUs from the CAA section 112(c) list without complying with the delisting provisions of CAA section 112(c)(9). *See New Jersey, 517 F.3d at 582-83.* The EPA also disagrees with the

commenter's assertion that EPA disregarded EO 12866 when making the 2000 finding. As stated in the Federal Register notice, the 2000 finding did not impose regulatory requirements or costs and was reviewed by the Office of Management and Budget (OMB) in accordance with the EO.[76]

2. New Technical Analyses

a. General Comments on New Technical Analyses

Comment: Several commenters stated that the new analyses, including the risk assessments and technology assessments, confirm that it remains appropriate and necessary to regulate U.S. EGU HAP under CAA section 112. These commenters stated that the new analyses provide even more support than the risk and technology information available at the time the 2000 finding was made, including information on further developed emissions control technology, proven and cost-effective control of acid gases using trona and dry sorbent injection, stabilized natural gas prices that makes fuel switching and switching dispatch to underutilized combined cycle plants more feasible, more information on ecosystem impacts from HAP, "hotspots" from the deposition of Hg around EGUs, the potential for re-emission of Hg, updated emissions data and future projections of HAP emissions, and modern air pollution modeling tools. One commenter states affordable control technology has been in use in this sector for 10 to 40 years, and studies on EGU-attributable Hg hazard has undergone two in-depth EPA reviews, as well as a review by the NAS. Several commenters claimed that regulating U.S. EGUs is appropriate and necessary

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[76] *65 FR 79831.*

to protect public health based on information provided in the new technical analyses. These commenters acknowledged the substantial reductions in HAP from recent regulations and new studies that confirm serious health risks from HAP exposure. One commenter stated that new studies show higher risks to fetuses than previously estimated, increasing the potential for neurodevelopmental effects in newborns. One commenter noted that EGUs are a major source of HAP, including HCl, HF, As, antimony, Cr, Ni, and selenium, all of which adversely affect human health. The commenter stated that because of these health effects, the EPA has ample evidence to support a determination that non-Hg HAP emissions present a risk to human health.

Other commenters disagreed that the new analyses confirm that it remains appropriate and necessary to regulate U.S. EGUs. One commenter claims that EPA tried to use the new technical analyses to provide retroactive justification for the 2000 finding, which only found "plausible links" of health effects and "potential concerns" of health effects of certain metal emissions, dioxins and acid based aerosols. The commenter also asserted that none of these new analyses demonstrate that EGU regulation under section 112 is necessary and appropriate.

One commenter agreed that EPA may supplement its finding with new information, analyses and arguments to reaffirm the 2000 finding up until EPA issues final emissions standards. The commenter noted that the CAA does not freeze the finding. However, another commenter argued that EPA does not have the authority to rely on new technical analyses because the CAA requires EPA to make the finding on the basis of the Utility Study alone.

According to that commenter, the EPA unreasonably stretched the language of CAA section 112 by considering new technical analyses.

Citing a report from Dr. Willie Soon that was submitted to the SAB, one commenter stated that the new technical analyses supporting the proposed rule do not conform to the Information Quality Act, which requires that information relied on by EPA be accurate, reliable, unbiased, and presented in a complete and unbiased manner.

Response: The EPA agrees with the commenters that state that the new technical analyses (*e.g.*, the risk assessments and technology assessment) confirm the 2000 finding and disagrees with the commenters that state otherwise. The EPA also agrees with the commenters that the 2000 finding was valid at the time it was made based on the CAA section 112(n)(1) studies and other information available to the Agency at that time. Furthermore, the EPA agrees with commenters that the final rule will lead to substantial reductions in HAP emissions from EGUs, that control of the HAP is estimated to lead to public health and environmental benefits as discussed in the RIA, that Hg emissions from U.S. EGUs pose a hazard to public health, and that non-Hg HAP emissions from EGUs pose a hazard to public health.

Although these new analyses were not required, the EPA agrees with the commenters that stated that EPA is authorized to conduct additional analyses to confirm the 2000 finding. The EPA disagrees with the commenter's assertion that the Agency is not authorized to consider new information and at the same time unable to use the information available in 2000 because, according to the commenter, that information is "stale." Under this theory, the Agency

could not ever make an appropriate and necessary finding prospectively, thereby excusing the Agency from its obligations to protect public health and the environment because it did not diligently act in undertaking its statutory responsibility to establish CAA section 112(d) standards within two years of listing EGUs. *See* CAA section 112(c)(5). This is an illogical result that finds no basis in the statute. The EPA also disagrees with the commenter's assertion that EPA may not consider new analyses conducted after the Utility Study in determining whether it is appropriate and necessary to regulate EGUs under section 112 for the reasons set forth in the preamble to the proposed rule.[77]

The EPA disagrees with the commenter's implycation that EPA conducted the new analyses because of alleged flaws in the 2000 finding. As explained in detail in the preamble to the proposed rule, the 2000 finding was wholly valid and reasonable based on the information available to the Agency at that time, including the Utility Study. Further, the EPA maintains that had it complied with the statutory mandate to issue CAA section 112(d) standards within two years of listing EGUs, the EPA would likely have declined to conduct new analyses. The EPA conducted new analyses because over 10 years had passed since the 2000 finding, and EPA wanted to evaluate HAP emissions from U.S. EGUs based on the most accurate information available, though the Agency was not required to reevaluate the 2000 finding. In conducting the new analyses, the EPA used this updated information to further support the finding.

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[77] *76 FR 24988.*

The EPA strongly disagrees with the commenter that stated that EPA failed to conform to the Information Quality Act. The EPA used peer reviewed information and quality-assured data in all aspects of the technical analyses used to support the appropriate and necessary finding supporting this regulation. In addition, the EPA submitted the Hg Risk TSD to the SAB for peer review, which "supports the overall design of and approach to the risk assessment and finds that it should provide an objective, reasonable, and credible determination of the potential for a public health hazard from mercury emitted from U.S. EGUs."[78] The SAB received the comments from Dr. Willie Soon, and had those comments available for consideration in their deliberations regarding the Hg risk analysis. The SAB specifically supported elements of the analysis criticized by Dr. Willie Soon regarding the use of the EPA RfD as a benchmark for risk and the connection between Hg emissions from U.S. EGUs and MeHg concentrations in fish. In addition, the risk assessment methodology for the non-Hg case studies is consistent with the methodology that EPA uses for assessments performed for Risk and Technology Review rulemakings, which underwent peer review by the SAB in 2009.[79] During the public comment period, the EPA also completed a letter peer review of the methods used to develop inhalation cancer risk estimates for Cr and Ni compounds, and those reviews were generally supportive. See above description of this peer review. For the final rulemaking, the EPA revised both risk assessments consistent with recommendations from the peer reviewers. The EPA relies on the SAB's review of the

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[78] U.S. EPA-SAB, 2011.

[79] U.S. EPA-SAB, 2010.

quality of the information supporting the analytical results. Accordingly, contrary to the commenters' assertions, the EPA acted consistently with the Information Quality Act as well as EPA's and OMB's peer review requirements.

b. Hg Emissions Estimates

1. Hg Emissions From EGUs

Comment: The commenters addressed the 2005 and 2016 emissions estimates for Hg and expressed concern that inaccuracies in these emissions estimates result in overestimates of risks from Hg deposition. Further, commenters compared EPA's 2010 estimate and 2016 estimate, and stated that it is not possible for 29 tons to be a correct inventory total for Hg emissions in both years given expected reductions from CSAPR. In addition, commenters specifically commented on assumptions included in the Integrated Planning Modeling (IPM), including a concern that Hg speciation factors used by IPM overestimate emissions in 2016. Other commenters noted that EGU sources are the predominant source of U.S. anthropogenic Hg emissions, particularly the oxidized and particulate forms of Hg that are of primary concern for Hg deposition.

Response: The EPA disagrees with commenters' assertions that the EPA's emissions estimates over-estimate risk. While EPA agrees that the 2005 Hg emissions may be overestimated, such an over-estimate in 2005 would actually lead to an under-estimate of risk in 2016 and not an overestimate of risk, as claimed by the commenter, because the ratio approach used by EPA to scale fish tissue data would under-estimate risk if 2005 Hg estimates were overestimated. Since the 2005 emissions are not used

as a starting point for 2016 emissions from IPM, any 2005 overestimate does not affect the 2016 emissions levels. The 2016 emissions are computed by IPM based on forecasts of demand, fuel type, Hg content of the fuel, and the emissions reductions resulting from each unit's configurations. *See* IPM Documentation for further information, which is available in the docket. No commenter has provided any evidence that the IPM 2016 emissions projection methodology resulted in an overestimate.

The EPA acknowledges that the current Hg emissions estimate would not be the same as the 2016 Hg emissions estimate given that compliance with CSAPR is anticipated to have some Hg co-benefits. For this reason, the EPA reflected emission reductions anticipated from CSAPR in the Hg deposition modeling for 2016 in the Hg Risk TSD. In the final rule, the EPA revised the estimate of Hg emissions remaining from U.S. EGUs in 2016, which includes additional emission reductions anticipated from the final CSAPR. The revised estimate shows that U.S. EGUs would emit 27 tons of Hg in 2016. Although EPA does not use the current Hg emissions estimates in any of the risk calculations, the EPA estimates that current Hg emissions are 29 tons. Conclusions about the trend between current emissions and emissions in 2016 are limited by the fact that different methods were used to compute the two estimates, as fully explained in the revised Emissions Overview memo in the docket.

The EPA disagrees with the commenter's assertion that incorrect Hg emission factors result in incorrect 2016 emissions. The 2016 projected Hg emissions are not based on emissions factors. The 2016 Hg emissions are computed by the IPM based on forecasts of

demand, fuel type, Hg content of the fuel, and the emissions reductions resulting from each unit's configurations. The speciation factors referenced by the commenter provide a basis for the speciation of total projected Hg emissions into particulate, divalent gaseous, and elemental species, and do not impact the total amount of Hg emissions.

The EPA agrees with commenters who noted that EGU sources are the predominant source of U.S. anthropogenic Hg emissions, and in particular the oxidized and particulate forms of Hg that are of primary concern for Hg deposition.

2. Global Hg Emissions

Comment: Several commenters stated that predicted Hg deposition relies heavily on the amount of gaseous elemental Hg used to define the boundary and initial conditions of a model, e.g., the Hg that enters the U.S. from outside the U.S. boundaries. The commenters asserted that this is especially important because Hg emissions from Asia—the region immed-iately upwind of North America that affects U.S. Hg deposition significantly and also affects it the most compared to other regions—are expected to continue to increase.[80]

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[80] Jaffe D., Prestbo E., Swartzendruber P., Weiss-Penzias P., Kato S., Takami A., Hatakeyama S., Kajii Y., 2005. "Export of Atmospheric Mercury From Asia," *Atmospheric Environment*, 39, 3029-3038.

[81] [82] [83] [84] [85] According to the commenter, this would affect the amount of Hg in the boundary and initial conditions. The commenters claim that EPA's modeling did not account for these emission changes, thus leading to an overestimate of U.S. EGU-attributable deposition in 2016.

Several commenters noted that Hg emissions from U.S. EGUs are small when compared to global Hg emissions totals and natural sources within the U.S. These commenters used a variety of information to support alternative conclusions about the necessity to control U.S. EGU emissions to reduce Hg risk: global Hg emissions inventories, global and regional photochemical modeling research, and observation-based assessments. A commenter stated that EPA has not acknowledged the dramatic decline in Hg

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[81] Jaffe D., Strode S., 2008. "Fate and Transport of Atmospheric Mercury From Asia," *Environmental Chemistry*, 5, 121.

[82] Pacyna E.G., Pacyna J.M., Sundseth K., Munthe J., Kindbom K., Wilson S., Steenhuisen F., Maxson P., 2010. "Global Emission of Mercury to the Atmosphere From Anthropogenic Sources in 2005 and Projections to 2020," *Atmospheric Environment*, 44, 2487-2499.

[83] Pirrone N., Cinnirella S., Feng X., Finkelman R.B., Friedli H.R., Leaner J., Mason R., Mukherjee A.B., Stracher G.B., Streets D. G., Telmer K., 2010. "Global Mercury Emissions to the Atmosphere From Anthropogenic and Natural Sources," *Atmospheric Chemistry and Physics*, 10, 5951-5964.

[84] Streets, D.G., Zhang, Q., Wu, Y., 2009. "Projections of Global Mercury Emissions in 2050." *Environmental Science & Technology* 43, 2983-2988.

[85] Weiss-Penzias P., Jaffe D., Swartzendruber P., Dennison J.B., Chand D., Hafner W., Prestbo E., 2006. "Observations of Asian Air Pollution in the Free Troposphere at Mt. Bachelor Observatory in the Spring of 2004," *Journal of Geophysical Research*, 110, D10304.

emissions from U.S. EGUs since the late 1990s (approximately 50 percent) to the current level or consider the relative magnitude of Hg emissions from U.S. EGUs compared to other sources, natural (such as fires) and human-caused.

Response: The EPA disagrees that boundary and initial conditions used in modeling Hg deposition need adjustment for several reasons. First, the EPA does not use the first 10 days of the modeling simulation in the analysis, which is more than sufficient to remove the influence of initial conditions on Hg deposition estimates.[86] Second, it is difficult to accurately characterize the speciation of Hg that flows into the U.S. from other countries due to the lack of data near the boundaries of the modeling domain. Third, the boundary inflow for the CMAQ Hg modeling used in the Hg deposition modeling are based on a global model GEOS-CHEM simulation using a 2000 based global inventory.[87] A recently published comparison of global Hg emissions by continent for 2000 and 2006 found that total Hg emissions from Asia (and Oceania) total 1,306 Mg/yr in 2000 and 1,317 Mg/yr in 2006.[88] The EPA has determined that because the Asian Hg

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[86] Pongprueksa, P., Lin, C.J., Lindberg, SE., Jang, C., Braverman, T., Bullock, O.R., Ho, T.C., Chu, H.W., 2008. "Scientific Uncertainties in Atmospheric Mercury Models III: Boundary and Initial Conditions, Model Grid Resolution, and Hg (II) Reduction Mechanism." *Atmospheric Environment* 42, 1828-1845.

[87] Selin, NE., Jacob, D.J., Park, R.J., Yantosca, R.M., Strode, S., Jaegle, L., Jaffe, D. 2007. "Chemical Cycling and Deposition of Atmospheric Mercury: Global Constraints From Observations." *Journal of Geophysical Research-Atmospheres* 112.

[88] Streets *et al.*, 2009.

emissions estimated in this study are nearly constant between 2005 and 2006, any adjustments to the boundary conditions or adjustments to modeled Hg deposition would be invalid and inappropriate. Recent research has shown that ambient Hg concentrations have been decreasing in the northern hemisphere since 2000.[89] Because emissions from Asia have not appreciably changed between 2000 and 2006 and ambient Hg concentrations have been decreasing, ENVIRON's analysis contains incorrect assumptions and we need not address them further. For these reasons and the large uncertainties surrounding projected Hg global inventories, the EPA concludes that the most appropriate technical choice is to keep the Hg boundary conditions the same between the 2005 and 2016 simulations.

The EPA also disagrees with the commenters' assertion that EPA has not acknowledged the decline in Hg emissions for the U.S. EGUs since the late 1990s. The EPA analyzed historical, current, and future projected Hg emissions from the power generation sector, as cited in the preamble to the proposed rule. The EPA also disagrees with the commenters' assertions that EPA failed to consider the relative magnitude of Hg emissions from U.S. EGUs compared to other sources. As noted in the Hg Risk TSD, the EPA modeled Hg emissions from U.S. and non-U.S. anthropogenic and natural sources to estimate Hg deposition across the country. The EPA also determined the contribution of Hg emissions from U.S. EGUs to total Hg deposition in the U.S. by running modeling simulations for 2005 and 2016

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[89] Slemr, F., Brunke, E.G., Ebinghaus, R., Kuss, J., 2011. "Worldwide Trend of Atmospheric Mercury Since 1995." *Atmospheric Chemistry and Physics* 11, 4779-4787.

with Hg emissions from U.S. EGUs set to zero. Based on the Hg Risk TSD, Hg emissions from U.S. EGUs pose a hazard to public health based on the total of 29 percent of modeled watersheds potentially at-risk. Our analyses show that of the 29 percent of watersheds with population at-risk, in 10 percent of those watersheds U.S. EGU deposition alone leads to potential exposures that exceed the MeHg RfD, and in 24 percent of those watersheds, total potential exposures to MeHg exceed the RfD and U.S. EGUs contribute at least 5 percent to Hg deposition.

The commenters suggest that Hg emissions from U.S. EGUs represent a limited portion of the total Hg emitted worldwide, including anthropogenic and natural sources. While EPA acknowledges that Hg emissions from U.S. EGUs are a small fraction of the total Hg emitted globally, it views the environmental significance of Hg emissions from U.S. EGUs and other domestic sources as a more germane consideration. Mercury is emitted from EGUs in three forms. Each form of Hg has specific physical and chemical properties that determine how far it travels in the atmosphere before depositing to the landscape. Although gaseous oxidized Hg and particle-bound Hg are generally local/regional Hg deposition concerns, all forms of Hg may deposit to local or regional watersheds. U.S. coal-fired power plants account for over half of the U.S. controllable emissions of the quickly depositing forms of Hg. Although emissions from international Hg sources contribute to Hg deposition in the U.S., the peer reviewed scientific literature shows that Hg emissions from U.S. EGUs in the U.S.

significantly enhance Hg deposition and the response of ecosystems in the U.S.[90] [91] [92] [93]

c. Hg Deposition Modeling

1. General Comments on Deposition Modeling

Comment: Several commenters stated that according to the ENVIRON report, the EPA overestimated U.S. EGU-attributable Hg deposition by 10 percent on average (and up to 41 percent in some areas). The commenters claim this overestimation is the result of boundary condition treatment, the exclusion of U.S. fire emissions,[94] and Hg plume chemistry approach. In addition, one commenter referenced the same ENVIRON report and stated that before implementation of controls required by the proposed rule, areas with relatively high EGU-attributable Hg deposition (one-fifth or more of total deposition) in 2016 constitute less than 0.25 percent of the contin-

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[90] Caffrey et al., 2010.

[91] Driscoll, C. T., Han, Y.-J., Chen, C. Y., Evers, D. C., Lambert, K. F., Holsen, T. M., *et al.*, (2007). "Mercury Contamination in Forest and Freshwater Ecosystems in the Northeastern United States." *BioScience*, 57(1).

[92] Keeler, G.J., Landis, M.S., Norris, G.A., Christianson, E.M., Dvonch, J.T., 2006. "Sources of Mercury Wet Deposition in Eastern Ohio, USA." *Environmental Science & Technology* 40, 5874-5881.

[93] White, E.M., Keeler, G.J., Landis, M.S., 2009. "Spatial Variability of Mercury Wet Deposition in Eastern Ohio: Summertime Meteorological Case Study Analysis of Local Source Influences." *Environmental Science & Technology* 43, 4946-4953.

[94] Finley, B.D., Swartzendruber, P.C., Jaffe, D.A., 2009. "Particulate Mercury Emissions in Regional Wildfire Plumes Observed at the Mount Bachelor Observatory." *Atmospheric Environment* 43, 6074-6083.

ental U.S. area, and only three grid cells have EGU contributions exceeding half of total deposition.

Another commenter suggested that current research shows that models of Hg atmospheric fate and transport overestimate the local and regional impacts of some anthropogenic sources, such as U.S. EGUs. Thus, according to the commenter, calculated contributions to Hg deposition and fish tissue MeHg levels from these sources represent upper bounds of actual contributions,[95] [96] and EPA should present results as estimates of lower and upper bound limits.

Response: The EPA disagrees with the information presented by ENVIRON. The ENVIRON report is based on the misapplication of multiple incommensurate modeling studies and false premises which include the incorrect notion that the boundary conditions are over-estimated and the idea that EPA should use in-plume chemistry that has not been explicitly characterized and peer reviewed. Reactions that may reduce gas phase oxidized Hg in plumes have not been explicitly identified in literature. Recent studies in central Wisconsin and central California suggest the opposite may happen; elemental Hg may

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[95] Seigneur, C., Lohman, K., Vijayaraghavan, K., Shia, R.L., 2003. "Contributions of global and regional sources to mercury deposition in New York State." Environmental Pollution 123, 365-373.

[96] Seigneur, C., Vijayaraghavan, K., Lohman, K., Karamchandani, P., Scott, C., 2004. "Modeling the atmospheric fate and transport of mercury over North America: power plant emission scenarios." *Fuel Processing Technology* 85, 441-450.

be oxidized to Hg(II) in plumes.[97] [98] Better field study measurements and specific reaction mechanisms need to be identified before making conclusions about potential Hg in-plume chemistry or applying surrogate reactions in regulatory modeling. The possibility that Hg(0) is oxidized to Hg(II) in plumes suggests coal-fired power plant Hg contribution inside the U.S. may be underestimated in EPA modeling.

The EPA asserts that the numbers suggested by the commenter are inaccurate, as it is not appropriate to adjust EPA's deposition estimates based on previous Hg modeling done with older Hg chemistry, in-plume reactions that have not been explicitly identified, and erroneous adjustments to Hg boundary inflow. Recent research has shown that ambient Hg concentrations have been decreasing in the northern hemisphere since 2000.[99] The EPA declines to revise this analysis as commenter suggests for several reasons, including available evidence indicates that emissions from China have not appreciably changed between 2000 and 2006[100] and ambient Hg concentrations have decreased, the commenter inappropriately comingled out-of-date Hg modeling simulations with EPA results, and ENVIRON's analysis has not undergone

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[97] Kolker, A., Olson, M.L., Krabbenhoft, D.P., Tate, M.T., Engle, M.A., 2010. "Patterns of mercury dispersion from local and regional emission sources, rural Central Wisconsin, USA." *Atmospheric Chemistry and Physics* 10, 4467-4476.

[98] Rothenberg, SE., McKee, L., Gilbreath, A., Yee, D., Connor, M., Fu, X.W., 2010. "Wet deposition of mercury within the vicinity of a cement plant before and during cement plant maintenance." *Atmospheric Environment* 44, 1255-1262.

[99] Slemr *et al.*, 2011.

[100] Streets *et al.*, 2009.

any scientific peer review and presents information with incorrect assumptions as noted in this response.

The EPA also disagrees with the commenter's interpretation of the applicability of wildfire Hg emissions to this assessment. Finley *et al.*, (2009)[101] suggests caution when using their field data to make assumptions about Hg(p) emissions from wildfires; the estimated particulate Hg emissions from wildfires is based on one field site with a limited sample size, and the assumptions made (such as the observed Hg(p) to carbon monoxide ratios at this location) may not be valid on a broader scale.[102] Mercury emissions from wildfires are a re-volatilization of previously deposited Hg.[103] Given that electrical generating power plants are currently and historically have been among the largest Hg-emitting sources, the inclusion of wildfire emissions in a modeling assessment would necessarily increase the contribution from this emissions sector.

The EPA disagrees with the assertion that EPA failed to consider the relative magnitude of Hg emissions from U.S. EGUs compared to other sources and disagrees with the interpretation of EGU deposition presented in the ENVIRON report. As noted in the Hg Risk TSD, the EPA modeled Hg emissions from U.S. and non-U.S. anthropogenic and natural sources to estimate Hg deposition across the country. The EPA also determined the contribution of Hg emissions from U.S. EGUs to total Hg deposition in the U.S. by

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[101] Finley *et al.*, 2009.

[102] *Id.*

[103] Wiedinmyer, C., Friedli, H., 2007. "Mercury emission estimates from fires: An initial inventory for the United States." *Environmental Science & Technology* 41, 8092-8098.

running modeling simulations for 2005 and 2016 with Hg emissions from U.S. EGUs set to zero. Hg emissions from U.S. EGUs pose a hazard to public health based on the total of 29 percent of modeled watersheds potentially at-risk. Our analyses show that of the 29 percent of watersheds with population at-risk, in 10 percent of those watersheds U.S. EGU deposition alone leads to potential exposures that exceed the MeHg RfD, and in 24 percent of those watersheds, total potential exposures to MeHg exceed the RfD and U.S. EGUs contribute at least 5 percent to Hg deposition. The ENVIRON report provides no risk analysis of EGU contribution.

The EPA disagrees that research[104] n105[105] presented by the commenter shows that U.S. EGU impacts are over-estimated. The commenter's references do not support this statement. The references provided by the commenter are based on Hg modeling that uses models that are no longer applied and that are based on out-dated Hg chemistry and deposition assumptions. Given the advances in Hg modeling since the early 2000s, the EPA does not believe an upper and lower bound estimate is necessary.

2. Chemical Reactions

Comment: Several commenters stated that the CMAQ modeling fails to account for the chemical reduction of gaseous ionic Hg to elemental Hg that may occur in EGU plumes. The commenters noted that EPA did not use the Electric Power Research Institute's (EPRI) Advanced Plume-in-Grid Treatment, which includes a surrogate reaction to reduce gaseous

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[104] Seigneur *et al.*, 2003.

[105] Seigneur *et al.*, 2004.

ionic Hg to elemental Hg inside plumes. Multiple commenters claimed that the reduction of reactive gaseous Hg to gaseous elemental Hg has been reported in power plant plumes and that supporting data include atmospheric concentrations of speciated Hg measured downwind of power plant stacks at ground-level monitor sites and dispersion model predictions.[106] [107] A detailed description of various plume measurement studies is provided in EPRI Comments, Section 3.4: Plant Bowen, Georgia, Plant Pleasant, Wisconsin, and Plant Crist, Florida. One commenter believed the impact of grid resolution (12 km sized grid cells) on the CMAQ modeling was not appropriately addressed by EPA. Their concerns due to grid resolution include the notion that a source's emissions will be averaged over the entire grid cell. According to the commenter, such averaging causes an artificially fast dilution that smoothes out areas of high and low deposition, which may limit the ability of the model to simulate smaller areas of localized high deposition. This commenter believed that using the APT would address these issues.

Response: The EPA disagrees with the commenters' claims that oxidized Hg chemically reduces to elemental mercury within the plume. There is no evidence of these chemical reactions in the scientific literature. The references cited by the commenters are from non-peer reviewed reports and conference proceedings. The

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[106] Edgerton, E.S., Hartsell, B.E., Jansen, J.J., 2006. "Mercury speciation in coal-fired power plant plumes observed at three surface sites in the southeastern U.S." *Environmental Science & Technology* 40, 4563-4570.

[107] Lohman, K., Seigneur, C., Edgerton, E., Jansen, J., 2006. "Modeling mercury in power plant plumes." *Environmental Science & Technology* 40, 3848-3854.

EPA does not consider information presented at conferences or industry reports to be peer reviewed literature, and consideration of oral presentation material would be inappropriate. Further, even these cited references do not provide sufficient information for incorporating the supposed reactions into the modeling (*e.g.*, specific chemical reactions, reaction rates, etc.); rather, the cited references only suggest that oxidized gas phase Hg could be reduced and postulate a possible pathway.

Recent studies in central Wisconsin and central California suggest the opposite may happen; elemental Hg may be oxidized to Hg(II) in plumes.[108] [109] Better field study measurements and specific reaction mechanisms need to be identified before making conclusions about potential Hg in-plume chemistry or applying surrogate reactions in regula-tory modeling. Currently, models such as Advanced Plume Treatment (APT) use a surrogate reaction for the potential reactive gas phase Hg reduction that may or may not occur in plumes.[110] Reactions that may reduce gas phase oxidized Hg in plumes have not been explicitly identified in literature. The application of potentially erroneous in-plume chemistry that is a fundamental component of APT would be inappropriate. In addition, the APT is not available in the most recent version of CMAQ. It would be inappropriate for EPA

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[108] Kolker *et al.*, 2010.

[109] Rothenberg *et al.*, 2010.

[110] Vijayaraghavan, K., Seigneur, C., Karamchandani, P., Chen, S.Y., 2007. "Development and application of a multipollutant model for atmospheric mercury deposition." *Journal of Applied Meteorology and Climatology* 46, 1341-1353.

to apply an out of date photochemical model with in-plume chemistry that has not been shown to exist.

The EPA agrees with the commenter that the CMAQ modeling with 12 km grid resolution may provide a lower bound estimate on EGU contribution as higher impacts using finer grid resolution are possible. The commenter's assertion that EGU impacts are likely higher further supports the final conclusions of the exposure modeling assessment. The EPA notes that the application of a photochemical model at a 12 km grid resolution for the entire continental U.S. is more robust in terms of grid resolution and scale that anything published in literature and represents the most advanced modeling platform used for a national Hg deposition assessment.

3. Modeled Deposition Compared to Measured Deposition

Comment: Multiple commenters expressed dissatisfaction related to EPA's model performance evaluation of CMAQ estimated Hg deposition. The commenters stated that EPA failed to evaluate the CMAQ model against real-world measurements and that EPA fails to provide first-hand information on wet and dry deposition processes. The commenters also stated that EPA needs to assess how predicted values of deposition compare to Mercury Deposition Network (MDN) data and how predicted values of ambient speciated Hg concentrations compare to measurement networks like AMNet and SEARCH. In addition, commenters stated that EPA used highly aggregated performance metrics comparing model estimates to observations that they believe result in a degraded and lenient operational evaluation of the modeling system. A commenter suggested that EPA's model performance provides no confidence for the

intended purpose of estimating deposition near point sources. One commenter simply noted that EPA's model over-estimated total Hg wet deposition at MDN monitors. Finally, several commenters noted that EPA presented a negative modeled wet deposition total in the Air Quality Modeling TSD, which is physically impossible.

Response: EPA agrees with the commenters that the negative estimate for wet deposition in the Air Quality Modeling TSD was an error. This error reflected an incorrect calculation in the post-processing of model and observation pairs that only influenced the calculation of model performance metrics. The error has been fixed, and the model performance metrics in the revised Air Quality Modeling TSD have been updated. This error did not affect Hg deposition. In response to comments, the EPA provided additional model performance evaluation by season to the revised Air Quality Modeling TSD. In addition, in response to comments, the EPA also included model performance evaluation for total Hg wet deposition for the 36 km modeling domain in the revised Air Quality Modeling TSD.

The EPA disagrees that it did not conduct an assessment comparing CMAQ total Hg wet deposition estimates to MDN data. The Air Quality Modeling TSD clearly shows a comparison of CMAQ estimated total Hg wet deposition with MDN data for the entire length of the modeling period. The CMAQ wet deposition of Hg has been and will continue to be extensively evaluated against MDN sites.[111] There

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[111] Bullock, O.R., Atkinson, D., Braverman, T., Civerolo, K., Dastoor, A., Davignon, D., Ku, J.Y., Lohman, K., Myers, T.C., Park, R.J., Seigneur, C., Selin, NE., Sistla, G., Vijayaraghavan, K., 2009. "An analysis of simulated wet deposition of mercury

is no dry deposition monitoring network, which precludes evaluating CMAQ dry deposition processes. The EPA disagrees that an evaluation of ambient speciated Hg against routine monitor networks such as AMNet or SEARCH would be useful for this particular modeling application. The AMNet Hg network did not exist in 2005, which is EPA's baseline model simulation time period, and the SEARCH network started making preliminary measurements of Hg at one or two sites in 2005. In addition, measurement artifacts related to gaseous oxidized Hg are difficult to quantify and make direct comparison to model estimates problematic.[112] Considering the problems associated with TEKRAN measurements of ambient Hg and the sparse nature of routine measurements in the U.S., the EPA did not compare ambient Hg against model estimates.

The EPA disagrees that the model performance presented in the air quality TSD is insufficient. The EPA asserts that the model performance evaluation is generally similar to the level of model performance presented in literature. One commenter presented the results of several Hg modeling studies as providing information that the commenter believes to be relevant for this assessment in terms of model performance metric estimation and the level of model performance evaluation shown for assessments modeling Hg near point sources. For example, one cited study titled "Modeling Mercury in Power Plant Plumes" models near-source Hg chemistry from U.S.

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from the North American Mercury Model Intercomparison Study." *Journal of Geophysical Research-Atmospheres* 114.

[112] Lyman. S.N., Jaffe, D.A., Gustin, M.S., 2010. "Release of mercury halides from KCl denuders in the presence of ozone." Atmospheric Chemistry and Physics 10, 8197-8204.

EGUs, but provides absolutely no information about model performance evaluation.[113]

Another commenter identified two studies as supposedly having Hg modeling results that are applicable to EPA's analysis.[114] [115] These studies present similar model performance metrics as EPA. The EPA disagrees that the Agency used "highly aggregated performance metrics" that result in degraded and lenient model evaluation. The studies presented[116] [117] as relevant for point source mercury modeling use an approach to aggregate the operational performance metrics across many monitor locations as did EPA; however, these articles calculate long term annual averages of modeled and observed total Hg wet deposition before estimating performance metrics. It is common practice to pair modeled estimates and observations in space and time (weekly in this case) and estimate performance metrics, then average all the metrics together. The latter is the

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[113] Lohman *et al.*, 2006.

[114] Seigneur, C., Lohman, K., Vijayaraghavan, K., Jansen, J., Levin, L., 2006. "Modeling atmospheric mercury deposition in the vicinity of power plants." *Journal of the Air & Waste Management Association* 56, 743-751.

[115] Vijayaraghavan, K., Karamchandani, P., Seigneur, C., Balmori, R., Chen, S.-Y., 2008. "Plume-in-grid modeling of atmospheric mercury." *Journal of Geophysical Research-Atmospheres* 113.

[116] Seigneur, C., Lohman, K., Vijayaraghavan, K., Jansen, J., Levin, L., 2006. "Modeling atmospheric mercury deposition in the vicinity of power plants." *Journal of the Air & Waste Management Association* 56, 743-751.

[117] Vijayaraghavan, K., Karamchandani, P., Seigneur, C., Balmori, R., Chen, S.-Y., 2008. "Plume-in-grid modeling of atmospheric mercury." *Journal of Geophysical Research-Atmospheres* 113.

approach taken by the EPA and should have been taken by the studies presented by the commenter. The EPA used a more stringent approach to match observations and predictions and aggregation of operational model performance. The EPA agrees that the commenter accurately restated total wet deposition model performance information provided by the EPA in the Air Quality Modeling TSD. To provide context, other Hg modeling studies show a positive bias for annual total Hg wet deposition.[118] [119]An annual Hg modeling application done by ENVIRON[120] and the Atmospheric and Environmental Research for Lake Michigan Air Directors Consortium show seasonal average normalized bias between 70 and 158 percent and seasonal average normalized error between 72 and 503 percent.[121] These results indicate a very large over-estimation tendency. The model performance shown by EPA is consistent with other long-term Hg modeling applications.

4. Excess Local Deposition From Hg Emissions From U.S. EGUs (Deposition Hotspots)

Comment: One commenter stated that reducing Hg will benefit local environments. The commenter stated

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[118] *Id.*

[119] Vijayaraghavan *et al.*, 2007.

[120] Yarwood, G, Lau, S., Jia, Y., Karamchandani, P., Vijayaraghavan, K. 2003. Final *Report: Modeling Atmospheric Mercury Chemistry and Deposition with CAMx for a 2002 Annual Simulation*. Prepared for Wisconsin Department of Natural Resources.
http://www.gypsymoth.wi.gov/air/toxics/mercury/hg_X97579601_appB.pdf.

[121] Yarwood *et al.*, 2003.

that a 2007 study confirmed the presence of Hg "hotspots" downwind from coal-fired power plants and confirmed that coal-fired power plants within the U.S. are the primary source of Hg to the Great Lakes and the Chesapeake Bay.[122] The commenter also stated that the study is consistent with a major Hg deposition study conducted by the EPA and the University of Michigan that concluded that approximately 70 percent of Hg wet deposition resulted from local fossil fuel emissions in the region.[123]

One commenter agreed with the Agency's assessment of the potential for deposition "hotspots" that shows that Hg deposition near EGUs can be three times as large as the regional average. The commenter stated that this excess Hg deposition would substantially increase the health and environmental risks associated with emissions at these sites. The same commenter also stated that EPA applied a conservative methodology to quantify near-source Hg deposition. The commenter stated that maximum excess local Hg deposition may be significantly underestimated by averaging high deposition sites downwind of an EGU in the direction of prevailing winds with lower excess deposition at locations close to but frequently upwind of the facility. The same commenter suggests that had EPA used CMAQ and individual 12x12 km^2 grid cells to quantify local deposition, the model could increase the excess Hg deposition at these locations significantly and place

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[122] Evers, David C. *et al.*, 2007. "Biological Mercury Hotspots in the Northeastern United States and Southeastern Canada," *Bioscience*. Vol. 57 No. 1. p. 29.

[123] Cohen, *et al.*, 2004. "Modeling the Atmospheric Transport and Deposition of Mercury to the Great Lakes," *Environmental Research 95*, (247-265).

them at even greater risk of adverse health and environmental effects of HAP from U.S. EGUs.

One commenter stated that the Hubbard Brook Research Foundation issued a report in 2007 that identified five Hg hotspots, one of which was in the Adirondack Park, along with four suspected hotspots.[124] The commenter stated that this study also provides a good description of the impacts of Hg on the Common Loon, which is a symbol of a healthy Adirondack environment.

One commenter stated that there is there is no evidence of Hg hotspots due to local deposition associated with coal-fired power plants. According to the commenter, the EPA's use of a 50 km radius to calculate hotspots is flawed. The commenter stated that modeling studies show that deposition of Hg emitted from power plants is not confined to a 50-km radius around the plants and that most emissions from power plants travel beyond 50 km.[125]

Several commenters stated that the EPA does not adequately define hotspots in this proposed rule. Those same commenters cited a previous EPA definition of hotspots as "a waterbody that is a source of consumable fish with MeHg tissue concentrations, attributable solely to utilities, greater than EPA's MeHg water quality criterion of 0.3 mg/kg" (milli-

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[124] Driscoll, C.T., D. Evers, K.F. Lambert, N. Kamman, T. Holsen, Y-J. Han, C. Chen, W. Goodale, T. Butler, T. Clair, and R. Munson. Mercury Matters: Linking Mercury Science with Public Policy inthe Northeastern United States. 2007. Hubbard Brook Research Foundation. Science Links Publication. Vol. 1, no. 3.

[125] Seigneur *et al.*, 2006.

grams per kilogram).[126] The same commenters stated that it is unclear why EPA changed from defining a hotspot by fish tissue MeHg concentration to defining a hotspot by depositional excess. Two commenters suggested that a Hg hotspot is a specific location that is characterized by elevated concentrations of Hg exceeding a well-established criterion, such as a reference concentration (RfC) when compared to its surroundings. Those same commenters stated that identifying Hg hotspots should not be constrained to locations where concen-trations can be attributed to a single source or sector.[127] One of those two commenters noted that others have defined "hotspots as a spatially large region in which environmental concentrations far exceed expected values, with such values (i.e. concentrations) being 2 to three standard deviations above the relevant mean."[128]

One commenter stated that Hg concentrations are not always highest at sites closest to a major source. The commenter referred to a study[129] that demonstrated that concentrations of atmospheric reactive gaseous Hg, gaseous elemental Hg, and fine particulate Hg were lower when measured 25 km from a

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[126] U.S. EPA, 2005. 40 CFR Part 63 [OAR-2002-0056; FRL-7887-7] RIN 2060-AM96. *Revision of December 2000 Regulatory Finding on the Emissions of Hazardous Air Pollutants From Electric Utility Steam Generating Units and the Removal of Coal- and Oil-Fired Electric Utility Steam Generating Units From the Section 112(c)*. Final rule, March 29.

[127] Evers *et al.*, 2007.

[128] Sullivan T., 2005. "The Impacts of Mercury Emissions from coal-fired Power Plants on Local Deposition and Human Health Risk." Presented at the Pennsylvania Mercury Rule Workgroup Meeting, October 28.

[129] Kolker, *et al.*, 2010.

1,114 MW coal-fired EGU than when measured 100 km away. The commenter stated that these findings contradict the idea, implicit in EPA's hotspot analysis, that reactive gaseous Hg decreases with distance from a large point source.

One commenter provided information from a non-peer reviewed report with wet Hg deposition measurements downwind from the coal-fired power plant Crist in Pensacola, FL. The commenter stated that using the same data from these same wet deposition sites, one study[130] found that Hg wet deposition and concentrations did not differ in a statistically significant manner among these three sites and that the concentrations values were similar to those from Mercury Deposition Network (MDN) sites that are more than 50 km away from Plant Crist located along the Northern Gulf of Mexico coast.

Another commenter stated that Plant Crist installed a wet scrubber and has operated that scrubber continuously since December 2009. The commenter stated that the scrubber reduces total Hg emissions by about 70 percent and reduces emissions of reactive gaseous Hg by about 85 percent. The commenter cited a non-peer reviewed conference presentation[131] that reported changes in Hg wet

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[130] Caffrey, J.M., Landing, W.M., Nolek, S.D., Gosnell, K.J., Bagui, S.S., Bagui, S.C., 2010. "Atmospheric deposition of mercury and major ions to the Pensacola (Florida) watershed: spatial, seasonal, and inter-annual variability." *Atmospheric Chemistry and Physics* 10, 5425-5434.

[131] Krishnamurthy N., Landing W.M, Caffrey J.M., 2011. "Rainfall Deposition of Mercury and Other Trace Elements to the Northern Gulf of Mexico." Presented at the 10th International Conference on Mercury as a Global Pollutant, Halifax, Nova Scotia, Canada, July 27.

deposition relative to historic measurements. The commenter stated that, taken collectively, these findings show that increased local total Hg deposition, possibly due to EGUs, and deposition changes due to changes in EGU emissions, are small.

Two commenters stated that a study by the Department of Energy (DOE) that collected and analyzed soil and vegetation samples for Hg near three U.S. coal-fired power plants—one in North Dakota, one in Illinois, and one in Texas—found no strong evidence of "hotspots" around these three plants.

Two commenters stated that analysis of long-term trends in Hg emissions from coal-fired EGUs and wet deposition in Florida concluded that statistical analysis does not show evidence of a significant relationship between temporal trends in Hg emissions from coal-fired EGUs in Florida and Hg concentrations in precipitation during 1998 to 2010.

Two commenters stated that the Hg Risk TSD presents no information, summary statistics, and/or actual calculations showing how excess deposition within 50 km of an EGU source is obtained. The commenters stated that by assessing only Hg deposition attributable to EGUs, the EPA fails to provide a context for all other sources of Hg deposition. The commenters stated that the Agency does not explain why deposition from the top 10 percent of EGU Hg emitters does not decline, despite substantial reductions in modeled Hg emissions from those sources between 2005 and 2016. According to the commenters this implies that the top 10 percent EGUs may have approximately as much of a regional effect as a local effect.

Two commenters stated that the CMAQ model has limitations when used to predict local deposition and tends to overestimate local deposition. The commenters stated that modeling studies using either a plume model or an Eulerian model predict that 91 to 96 percent of the Hg emitted by an EGU travels beyond 50 km.[132]

Response: The EPA agrees with the commenters that stated that Hg emissions from EGUs deposit locally and regionally and contribute to excess local deposition near U.S. EGUs. The EPA acknowledges additional studies[133] cited by those commenters that corroborate EPA's conclusions. However, the EPA disagrees with those commenters' characterization of the methodology used to calculate the potential for excess local deposition. In response, the EPA has clarified the methodology in the new TSD entitled "Technical Support Document: Potential for Excess Local Deposition of U.S. EGU Attributable Mercury in Areas near U.S. EGUs," which is available in the docket.

The EPA agrees that there is no generally agreed-upon definition of "hotspot." As discussed in the preamble and TSD, for the purposes of the appropriate and necessary finding, the EPA determined that information on the potential for excess deposition of Hg in areas surrounding power plants would be useful in informing the finding. The EPA disagrees with some commenters who misinterpreted the intent of the Hg deposition hotspot analysis. Specifically, the analysis is not of "Hg hotspots", which are often defined as high Hg concentration in fish, but rather of

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[132] Edgerton *et al.*, 2006.

[133] Driscoll *et al.*, 2007.

Hg deposition hotspots, defined as excess local Hg deposition around U.S. EGUs, as clarified in the new Local Deposition TSD. Because EPA did not identify "Hg hotspots" of high Hg concentrations in fish, the EPA's MeHg water quality criterion of 0.3 mg/kg is irrelevant to EPA's analysis of excess local Hg deposition for this rule.

The EPA disagrees that the analysis assumes that deposition of Hg is confined to a 50-km radius around power plants. The purpose of the EPA's analysis was to evaluate whether there existed "excess deposition of Hg in nearby locations within 50 km of EGUs that might result in Hg deposition hotspots'." As explained further in the new TSD, the EPA calculated the average EGU-attributable deposition (based on CMAQ modeling of Hg deposition) in the area 500 km around each plant and the average EGU-attributable deposition in the area 50 km around each plant. The difference between those two values is the excess local deposition around the plant. The EPA does not suggest Hg emissions from power plants stop at 50 km from the source. Some portion of EGU emissions deposit before 50 km, and some portion travels beyond 50 km. In addition, Hg disperses as it transports, so the average EGU contribution can be lower in areas beyond 50km relative to areas within 50km even though Hg emissions from EGUs are depositing into U.S. watersheds.

The EPA disagrees with some commenters' interpretation of the analysis as being focused on local deposition from all sources. In fact, the focus was on excess local deposition, rather than all local deposition. The EPA has clarified the purpose of the excess local deposition analysis in the new TSD. The EPA agrees that all EGUs add to local deposition,

however, not all EGUs have local deposition that greatly exceeds regional deposition, which is the relevant question. The EPA disagrees that the DOE study referenced by the commenters attempted to assess the same analytical question as EPA's analysis. The DOE study focused on comparisons of total deposition near and far from power plants. The EPA's analysis did not focus on total Hg deposition, because as EPA acknowledges throughout its analysis, global sources of Hg deposition account for a large percentage of total Hg deposition. In addition, including global sources of Hg deposition would obscure the comparison of local and regional U.S. EGU-attributable Hg deposition. Because of regional deposition from both domestic and global sources of Hg, total Hg deposition at any location is unlikely to be highly correlated with local sources. The EPA's analysis focused on U.S. EGU-attributable Hg deposition and demonstrates that for some plants (especially those with high Hg emissions), there is local deposition of Hg that exceeds the average regional deposition around the plant.

The EPA's analysis shows heterogeneity in the amount of excess local deposition around plants. The new Local Deposition TSD shows that some plants can have local deposition that is less than the regional average deposition, suggesting that most of the Hg from those plants is transported regionally or that other EGUs in the vicinity of those plants dominate the deposition of Hg near the plants. This does not detract from the overall finding that around some power plants with high levels of Hg emissions excess local deposition is on average three times the regional EGU-attributable deposition around those plants.

The EPA disagrees that the Hg Risk TSD did not provide sufficient information regarding the excess local deposition calculation. Nonetheless, the EPA has further clarified the methodology in the new Local Deposition TSD, including further descriptions of the method used to calculate the local and regional deposition around power plants along with maps and tables of results.

The EPA disagrees with the commenters that stated that the discussion of local deposition in the Hg Risk TSD did not demonstrate that Hg deposition from the top 10 percent of EGU Hg emitters declines. Table 1 of the new Local Deposition TSD clearly shows that mean local deposition (within 50km of a plant) for the top 10 percent of emitters declines from 4.89 micrograms per cubic meter ($\mu g/m^3$) to 1.18 $\mu g/m^3$. What does not change is the percent local excess for EGU-attributable Hg deposition. This implies that while Hg deposition from EGUs is declining, there is still an excess contribution to local deposition relative to regional deposition; *e.g.*, because of dispersion, the contribution to average deposition outside 50 km from the plant is lower than the contribution to average deposition within 50 km of the plant.

The EPA disagrees that the information[134] provided by the commenter regarding the Crist plant and other coal-fired power plants in Florida is relevant to EPA's analysis of excess local deposition from U.S. EGUs because it is based on measurements of wet Hg deposition without consideration of dry Hg deposition, which can be a significant component of Hg deposition.

The EPA disagrees with the commenter regarding the interpretation of the literature related to the

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[134] EPRI, 2010.

spatial extent of deposition of Hg emitted by U.S. EGUs. The EPA also disagrees that the peer-reviewed CMAQ model has limitations for this application or overestimates local deposition. The commenter does not provide any credible support for the assertion that grid-based models typically overestimate local deposition surrounding EGUs. The EPA maintains that the CMAQ photochemical model represents the best science currently available in simulating atmospheric chemistry, transport, and deposition processes.

The study[135] cited by the commenter to support the notion that 91 to 96 percent of Hg emitted from power plants travels beyond 50 km is based on a photochemical transport model (the TEAM model) that does not employ current state-of-the-science and is not actively developed or updated. Furthermore, the modeling is based on grid cells that are 20 km in size, which limits generalizability to EPA modeling performed at 12 km grid resolution using a state of the science photochemical grid model. The cited modeling study ignores dry deposition of elemental Hg from all sources, an assumption that clearly limits the regional impacts from sources.[136] The methodology of this study cited by the commenter is critically flawed in that it presents no results where individual Hg emission sources are removed and the difference between the zero out simulation (where emissions from U.S. EGUs are set to zero) and the baseline model simulations are directly compared. Finally, the modeling study cited by the commenter presents an illustration of gridded total annual Hg deposition from

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[135] Seigneur *et al.*, 2006.

[136] *Id.*

the TEAM model for the eastern U.S. that clearly shows elevated annual total Hg deposition in the vicinity of coal-fired power plants in the Ohio River Valley and northeast Texas.

d. Hg Risk TSD

1. Assumption of Linear Proportionality in Relationship Between Changes in Hg Deposition and Changes in Fish Tissue Hg Concentrations (Mercury Maps)

Comment: Several commenters criticized EPA's assumption that changes in deposition resulting from U.S. EGU emissions of Hg will result in proportional changes in fish tissue Hg concentrations at the watershed level, as supported by the Mercury Maps modeling exercise. According to one commenter, the Mercury Maps model has limited capability to adequately determine bioaccumulation in fish. The same commenter stated that the Mercury Cycling Model (MCM) developed by EPRI is a more rigorous model that was developed expressly to evaluate the relationship between changes in atmospheric Hg deposition to waterbodies and changes in fish tissue MeHg levels.

Several commenters stated that the Mercury Maps model has many deficiencies. Those commenters stated that Mercury Maps is a static model unable to account for the dynamics of ecosystems that affect Hg bioaccumulation in fish, cannot consider non-air Hg inputs to watersheds, and assumes reductions in airborne Hg lead to proportional reductions in fish MeHg concentrations. Another commenter claimed that data that demonstrate a steady-state linear reduction in fish tissue MeHg in response to a reduction in atmospheric Hg deposition within

watersheds do not exist and provided several references that they claimed show non-linear responses to changes in Hg deposition.[137] [138]

The same commenter disagreed with EPA's interpretation of Figure 2-17 in the March TSD and stated that a U.S. Geological Survey national waterway study[139] showed that sheet flow and drainage, not deposition, dominated input to the waterbodies it surveyed. The commenter stated that sheet flow and drainage could contain Hg and thus complicate the relationship that EPA asserts is linear and direct. Another commenter cited Figure 2-17 in the Hg Risk TSD as showing that there is no well-defined

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[137] Harris., R.C., John W.M. Rudd, Marc Amyot, Christopher L. Babiarz, Ken G. Beaty, Paul J. Blanchfield, R.A. Bodaly, Brian A. Branfireun, Cynthia C. Gilmour, Jennifer A. Graydon, Andrew Heyes, Holger Hintelmann, James P. Hurley, Carol A. Kelly, David P. Krabbenhoft, Steve E. Lindberg, Robert P. Mason, Michael J. Paterson, Cheryl L. Podemski, Art Robinson, Ken A. Sandilands, George R. Southworth, Vincent L. St. Louis, and Michael T. TateRudd, J. W.M., Amyot M., *et al.*, Whole-Ecosystem study Shows Rapid Fish-Mercury Response to Changes in Mercury Deposition. Proceedings of the National Academy of Sciences Early Edition, PNAS 2007 104 (42) pp. 16586-16591; (published ahead of print September 27, 2007).

[138] Orihel D.M., Paterson M.J., Blanchfield P.J., Bodaly R.A., Gilmour C.C., Hintelmann H., 2007. "Temporal Changes in the Distribution, Methylation, and Bioaccumulation of Newly Deposited Mercury in an Aquatic Ecosystem,"*Environmental Pollution*, 154, 77-88.

[139] Scudder B.C., Chasar L.C., Wentz D.A., Bauch N.J., Brigham M.E., Moran P.W., Krabbenhoft D.P., 2009. *Mercury in fish, bed sediment, and water from streams across the United States, 1998-2005:* U.S. Geological Survey Scientific Investigations Report 2009-5109, 74 p.

relationship between Hg deposition and MeHg concentrations in fish tissue on a national basis.

Several commenters provided comments related to the assumption that fish tissue Hg levels used in the analysis represent a steady-state. One commenter stated that given the demonstrated lag time in response to deposition change, it is logical to conclude that a lag time needs to be incorporated in Mercury Maps to adjust the estimation of how much fish tissue MeHg levels decrease in response to decreases in Hg deposition attributable to U.S. EGUs. According to the same commenter, the METAALICUS study shows that there is a lag time (and a non-proportional response) after 3-4 years. The same commenter noted that there are numerous factors that influence lag time including (1) watershed characteristics,[140] (2) the fact that watersheds may act as legacy sources releasing Hg when disturbed,[141] (3) the magnitude of emission reductions and subsequent changes in atmospheric deposition need to be weighed against the amount of Hg already in an ecosystem,[142] (4) the

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[140] Grigal D.F., 2002. "Inputs and Outputs of Mercury from Terrestrial Watersheds: A Review," *Environmental Review,* 10, 1-39.

[141] Yang H., Rose N.L., Battarbee R.W., Boyle J.F., 2002. "Mercury and Lead Budgets for Lochnagar, a Scottish Mountain Lake and Its Catchment," *Environmental Science & Technology,* 36, 1383-1388.

[142] Krabbenhoft D.P., Engstrom D., Gilmour C., Harris R., Hurley J., Mason R., 2007. Monitoring and Evaluating Trends in Sediment and Water Indicators. In Harris R., Krabbenhoft D., Mason R., Murray M.W., Reash R., Saltman T. (Eds.), *Ecosystem Responses to Mercury Contamination: Indicators of Change.* New York: Society of Environmental Toxicology and Chemistry (SETAC) North America Workshop on Mercury Monitoring and Assessment, CRC, pp. 47-87.

distance of an ecosystem from Hg sources,[143] and (5) the fact that Hg deposited to aquatic ecosystems becomes less available for uptake by biota over time.[144] Another commenter stated that additional Mercury Maps assumptions do not allow for considerations of lag in response to changes in: (1) Deposition, (2) legacy sources of Hg such as mining, (3) historical Hg deposition, (4) natural Hg levels in fish, (5) ecosystem dynamics over time, or (6) the relative source contributions over time. Another commenter stated that lag times need to be included in the modeling and be able to vary from watershed to watershed and sometimes even from waterbody to waterbody within a watershed. Several commenters stated that the emission rates of Hg due to U.S. sources have been decreasing for more than a decade, while emissions due to sources outside the U.S. have been increasing. For this reason, the commenter asserted that the system is not at steady-state, a basic premise of the model. Another commenter stated that while the time lag for deposition to reach a waterbody is mentioned in the Hg Risk TSD, there is no discussion of the fact that a portion of the deposition is unlikely to reach the water at all.

One commenter believes EPA incorrectly implied that its EGU risk estimates using Mercury Maps are underestimated because they do not account for legacy

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[143] Lindberg S. *et al.* 2007. "A synthesis of progress and uncertainties in attributing the sources of mercury in deposition." Ambio 36(1): 19-32.

[144] Orihel D.M., Paterson M.J., Blanchfield P.J., Bodaly R.A., Hintelmann H., 2008. "Experimental Evidence of a Linear Relationship between Inorganic Mercury Loading and Methylmercury Accumulation by Aquatic Biota," *Environmental Science & Technology,* 41, 4952-4958.

EGU-attributable deposition, which EPA assumes to be higher.

One commenter stated that while EPA properly screened out watersheds with significant current non-air sources of Hg, the EPA did not adequately screen out watersheds with significant Hg contributions from non-air sources, specifically watersheds with historic Hg or gold mining or other industrial Hg discharges. The same commenter stated that EPA's study was not geographically balanced and was dominated by rivers in the coastal region of the southeast that has numerous wetlands, which are favorable locations for methylation and have conditions that are not typical of much of the rest of the U.S.

Response: The EPA disagrees with the commenters who challenged the assumption of a linear proportional relationship between changes in U.S. EGU deposition and fish tissue Hg levels. The EPA specifically asked the SAB to evaluate EPA's assumption of linear proportionality in the relationship between Hg deposition and fish tissue MeHg concentrations, supported by the Mercury Maps analysis. The SAB peer review committee provided the following overall response, which generally supports EPA's approach:

The SAB agrees with the Mercury Maps approach used in the analysis and has cited additional work that supports a linear relationship between mercury loading and accumulation in aquatic biota. These studies suggest that mercury deposited directly to aquatic ecosystems can become quickly available to biota and accumulated in fish, and reductions in atmospheric mercury deposition should lead to decreases in methylmercury concentrations in biota. The SAB notes other modeling tools are available to link deposition to fish concentrations, but does not

consider them to be superior for this analysis or recommend their use. The integration of Community Multiscale Air Quality Modeling System (CMAQ) deposition modeling to produce estimates of changes in fish tissue concentrations is considered to be sound. Although the SAB is generally satisfied with the presentation of uncertainties and limitations associated with the application of the Mercury Maps approach in qualitative terms, it recommends that the document include quantitative estimates of uncertainty available in the existing literature.[145]

The SAB peer review committee specifically addressed the MCM suggested by the commenter and had the following response:

> The SAB agrees with the application of Mercury Maps in this assessment. There are other modeling tools capable of making a national scale assessment, such as the Regional Mercury Cycling Model (R-MCM). However, the R-MCM is more data intensive and the results produced by the two model approaches should be equivalent.
>
> The R-MCM, a steady-state version of the time-dependent Dynamic Mercury Cycling Model, has been publicly available to and used by the EPA (Region 4, Athens, Environmental Research Laboratory) for a number of years. R-MCM requires more detail on water chemistry, methylation potential, etc., and yields more information as well. Substantial data support the Mercury Maps and the R-MCM steady-state results, so that the results of the sensitivity analysis and the outcomes from using the alternative models would be equivalent between

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[145] U.S. EPA-SAB, 2011.

> the two modeling approaches. Though running an alternative model framework may provide additional reassurance that the Mercury Maps "base case" approach is a valid one, it is unlikely that substantial additional insight would be gained with the alternative model framework.[146]

In addition, the SAB stated, "Since the Mercury Maps approach was developed, several recent publications have supported the finding of a linear relationship between mercury loading and accumulation in aquatic biota.[147] [148] [149] These studies suggested that mercury deposited directly to aquatic ecosystems can become quickly available to biota and accumulated in fish, and that reductions in atmospheric mercury deposition should lead to decreases in methylmercury concentrations in biota. These results substantiate EPA's assumption that proportionality between air deposition changes and fish tissue methylmercury level changes is sufficiently robust for its application in this risk assessment."[150]

Based on the responses of the SAB peer review committee, the EPA's use of the linear proportionality assumption, supported by the Mercury Maps analysis, is well-supported.

The EPA also disagrees with commenters' interpretation of Figure 2-17. As stated in the Hg Risk TSD, while this figure is useful to demonstrate the lack of correlation across watersheds between total

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[146] U.S. EPA-SAB, 2011.

[147] U.S. EPA-SAB, 2011.

[148] Orihel *et al.*, 2008.

[149] Harris *et al.*, 2007.

[150] U.S. EPA-SAB, 2011.

deposition of Hg and MeHg concentrations in fish tissue, it is not indicative of the likely correlation between changes in Hg deposition at a given watershed and changes in MeHg concentrations in fish tissue from that watershed. The SAB agreed with this interpretation, noting the importance of Figure 2-17 demonstrating that "spatial variability of deposition rates is only one major driver of spatial variability of fish methylmercury and that variability of ecosystem factors that control methylation potential (especially wetlands, aqueous organic carbon, pH, and sulfate) also play a key role."[151]

In response to recommendations from the SAB, the EPA expanded the discussion of uncertainties associated with the linearity assumption, including uncertainties related to the potential for sampled fish tissue Hg level to reflect previous Hg deposition and the potential for non-air sources of Hg to contribute to sampled fish tissue Hg levels. Each of these sources of uncertainty may result in potential bias in the estimate of exposure associated with current deposition. The EPA took steps to minimize the potential for these biases by (1) only using fish tissue Hg samples from after 1999, and (2) screening out watersheds that either contained active gold mines or had other substantial non-U.S. EGU anthropogenic emissions of Hg. The SAB commented that EPA's approach to minimizing the potential for these biases to affect the results of the risk analysis appears to be sound and that additional criteria that could be applied are unlikely to substantially change the results. As a result, the EPA disagrees with the commenter that EPA's screening process is inade-

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[151] U.S. EPA-SAB, 2011.

quate. In addition, we conducted several sensitivity analyses to gauge the impact of excluding watersheds with the potential for non-EGU Hg emissions, and found that the results were robust to these exclusions.

In response to specific comments regarding the use of the Mercury Maps model, the EPA clarifies that the Hg Risk TSD did not directly use the Mercury Maps model. Instead, the EPA applied an assumption of linear proportionality between changes in Hg deposition and changes in MeHg concentrations in fish that is supported by the Mercury Maps modeling. By assuming steady-state conditions in apportioning fish tissue Hg levels and risk, the EPA does not attempt to project lag times. Recent research cited by the SAB[152] [153] [154] identifies relatively rapid response of fish tissue Hg to changes in Hg loading, which suggests that fish tissue Hg levels could react more quickly to reductions in Hg deposition than previously thought. This finding reduces concern that fish tissue Hg levels could be linked to older patterns of Hg deposition and strengthens the approach used in the revised Hg Risk TSD. While fish tissue may respond rapidly to changes in Hg loading, this does not change the fact that previously emitted Hg from U.S. EGUs can be re-emitted and re-deposited, and thus affect Hg concentration in fish.

2. Characterization of Subsistence Fishing Populations and Exposure Scenario

Comment: Several commenters stated that EPA provides no clear definition of subsistence, near

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[152] Orihel *et al.*, 2007.

[153] Orihel *et al.*, 2008.

[154] Orihel *et al.*, 2007.

subsistence, or high-end fish consumption, instead assuming that poverty is a direct indication of subsistence fishing and high-end fish consumption. One commenter stated no documentation exists to supports these assumptions. Another commenter stated that EPA's definitions of subsistence fishers in the Hg Risk TSD are not consistent with earlier EPA documents and are used inconsistently throughout the Hg Risk TSD. Several commenters stated that while subsistence fishing can be associated with poverty, poverty does not indicate subsistence fishing. One commenter stated that by including watersheds with as few as 25 members of individuals living in poverty, the EPA overstates risks.

One commenter stated that it is unclear what literature the Agency says "generally supports the plausibility of high-end subsistence-like fishing * * * to some extent across the watersheds" and stated that if other studies exist, the EPA should provide the values for comparison.

One commenter stated that EPA combined two parameters with differing scales to establish the geographic unit used in the Hg Risk TSD risk assessment. The HUC watersheds are based on average about 35 square miles in size, while U.S. census tracts used to identify watersheds relevant for subpopulations of interest—cover a few tenths to hundreds of square miles. Several commenters stated that it is unclear how the analysis handled differences in geographic resolution between watersheds and census tracts were.

One commenter stated that the procedure for assigning census tracts could bias exposure outcomes. For example, the commenter stated that a single influential census tract in a watershed could drive

risk, even if the watershed had only a minimal number of fish samples. The commenter stated that this possibility is a concern in urban areas, which account for the majority of census tracts, because these census tracts are more likely to be included in a risk analysis because they have more than 25 people living in poverty. The commenter stated that these census tracts may drive the extremes of the distribution without regard to the actual number of high-level, self-caught fish consumers within their boundaries. The commenter stated that they could not assess the potential bias and noted that EPA did not test the bias by sensitivity analyses.

Several commenters stated that EPA was not clear whether the poverty criteria were applied in all scenarios or just for the high-end female fish consumer scenario. One commenter stated that EPA should apply the minimum 25 source population criteria only to populations of women of childbearing age. One commenter stated that EPA's assumption would result in any densely populated urban census tract with a single fish tissue sample being assigned to a modeled watershed with populations potentially at-risk, regardless of the actual degree of recreational or subsistence fishing taking place there.

Response: The EPA agrees with the comments that subsistence fish consumption was not clearly defined, and we have provided a clearer definition in the revised Hg Risk TSD, however, this clarification does not result in any changes to the quantitative analysis. In the revised Hg Risk TSD, the EPA clarifies that "subsistence fishers" are defined as individuals who rely on noncommercial fish as a major source of

protein.[155] This definition is reflected in the range of fish consumption rates used in estimating risk. The likely presence of this type of subsistence fish consumer is supported by available peer reviewed literature (*See* Table 1-5 of the revised Hg Risk TSD). These studies clearly show that a subset of surveyed fishers consumes self-caught fish at the rates cited in the Hg Risk TSD. The SAB peer review concluded that the consumption rates and locations for fishing activity are supported by the data presented in the Hg Risk TSD, and are generally reasonable and appropriate given the available data.[156]

The EPA notes that there is some confusion in the comments related to the size of the watersheds modeled. Several commenters stated that HUC watersheds are 35 km on a side. The commenters appear to be referring to HUC8 classifications. The HUCs are defined for varying spatial resolutions. The geographic unit used as the basis for generating risk estimates is HUC12, which are watersheds about 10 km on a side, which is comparable with the size of the 12 km^2 grid cells in CMAQ, which are 12 km^2. The EPA has also clarified that the specific unit of analysis for this assessment is at the watershed, not enumerated subpopulations.

The EPA only used the U.S. Census tracts to determine whether there are populations in the vicinity of a given watershed, which could increase the

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[155] U.S. EPA, U.S. Environmental Protection Agency. 2000. *Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories*, Volume 3: Overview of Risk Management. Office of Science and Technology, Office of Water, U.S. Environmental Protection Agency, Washington, DC EPA 823-B-00-007.

[156] U.S. EPA-SAB, 2011.

potential for a category of subsistence fishers to be active at that watershed. In the revised Hg Risk TSD, the EPA modified the female subsistence scenario to apply equally to all watersheds with fish tissue Hg data based on the likelihood that these populations have the potential to fish at most watersheds. As described in the revised Hg Risk TSD, the EPA made this change in response to SAB's concerns regarding the potential exclusion of watersheds with fewer than 25 individuals and regarding coverage for high-end recreational fish consumption.[157] Thus, concerns regarding the use of census data to select watersheds with the potential for subsistence fishing no longer apply to this scenario. However, for the remaining subsistence scenarios, the EPA continues to use U.S. Census tract-level data to evaluate the presence of a "source population" in the vicinity of the watershed being modeled for risk. In this context, the EPA uses the U.S. Census data to assess whether a socio-economic status (SES)-differentiated group similar to the particular type of subsistence fisher being modeled (*e.g.*, poor Hispanics) are located in the vicinity of the watershed. If a source population is nearby, then this increases the potential that subsistence fishing activity could occur for that population scenario.

The EPA continues to model risk for white and black subsistence fishers active in the southeast and for Hispanics assessed nationally. In this case, the EPA links poverty with subsistence fishing, as EPA only modeled locations with poor source populations.

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[157] This change led to a very small increase in the number of watersheds with populations potentially at-risk. In the Hg Risk TSD accompanying the proposed rule, approximately 4 percent of modeled watersheds were excluded based on the SES-based filtering criteria.

However, in modeling these three populations, the EPA asserts that the presence of a poor source population indicates the potential for subsistence fishing activity, rather the presence of such activity. The linkage between poverty and higher rates of subsistence fish consumption is supported by the Burger *et al.* study,[158] which identified sub-stantially higher consumption rates for poor individuals (*See* Table 5 of the study). The EPA acknowledges that subsistence fishing activity by specific subpopulations might only be present across a subset of the watersheds EPA modeled for risk. However, given the stated goal of the analysis to de-termine the percent of watersheds where the potential exists for exposures to U.S. EGU-attributable Hg to represent a public health hazard, identifying a set of watersheds with the potential for the type of high fish consumption that leads to high Hg exposure is appropriate. The EPA notes that relatively few watersheds (less than 4 percent) have fish tissue Hg data, and, thus, can be included in the risk assessment. Consequently, while there is the potential for including some watersheds in the analysis that may not have currently active subsistence fishing activity, it is likely that EPA excluded other water-sheds from the analysis where this type of subsistence fishing activity occurs due to a lack of fish tissue Hg data.

While EPA agrees with the comment that it is likely that exposure to total MeHg through commercial fish consumption represents a more significant risk for the general population than consumption of

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[158] Burger, J., 2002. "Daily Consumption of Wild Fish and Game: Exposures of High End Recreationists," *International Journal of Environmental Research and Public Health*, 12 (4), 343-54.

freshwater fish obtained through self-caught fishing activity, exposure to total MeHg through self-caught fish consumption is the most significant risk for subsistence fishing populations and high-end recreational fishers. For the subset of these populations that focus their fishing activity in freshwater streams and lakes, it is also the case that they will experience a higher fraction of MeHg exposure attributable to U.S. EGU Hg emissions. As a result, the EPA focused the risk assessment on subsistence fishers active at inland freshwater watersheds because they are likely to experience the highest levels of individual risk as a result of exposure to U.S. EGU-attributable Hg.

3. Cooking Loss Adjustment Factor

Comment: Several commenters stated that EPA did not justify the selection of a cooking loss factor of 1.5 that, according to one commenter, increases estimated intake by 50 percent, thus increasing the daily MeHg intake rate by a constant factor of 33 percent and also increasing any resulting (HQ) risk estimate by a similar factor. Several commenters stated that the source of EPA's selected loss factor[159] reported a range of cooking losses from 1.1 to 6. Several commenters cite several studies that report no or highly variable changes in MeHg levels as a result of

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[159] Morgan, J.N., M.R. Berry, and R.L. Graves. 1997. "Effects of Commonly Used Cooking Practices on Total Mercury Concentration in Fish and Their Impact on Exposure Assessments." *Journal of Exposure Analysis and Environmental Epidemiology* 7(1):119-133.

cooking fish.[160] [161] [162] [163] [164] One commenter suggested that EPA's cooking loss adjustment factor of 1.5 is at the high-end of the values supported by the literature. Another commenter stated that EPA has used other adjustment factors in previous documents, and that the adjustment factor should not be fixed across different populations given potential differences in cooking practices. Several commenters noted that the cooking loss adjustment factor should only be applied to estimates of consumption rates for prepared fish, and that some sources of consumption rates are based on raw fish.

Response: The EPA disagrees with the commenters that the selection of the cooking loss factor of 1.5 is not justified by the literature. The EPA also disagrees with the comment that the cooking loss adjustment factor of 1.5 is at the high-end of the range of values in

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[160] Armbruster G., Gerow K.G., Lisk D.J., 1988. "The Effects of Six Methods of Cooking on Residues of Mercury in Striped Bass," *Nutrition Reports International,* 37, 123-126.

[161] Gutenmann, W.H. and Lisk D.J., 1991. "Higher Average Mercury Concentration in Fish Fillets after Skinning and Fat Removal," *Journal of Food Safety,* 11, 99-103.

[162] Farias L.A., Favaro, D.I., Santos J.O., Vasconcellos M.B., *et al.,* 2010. "Cooking Process Evaluation on Mercury Content in Fish," *Acta Amazonia,* 40 (4), 741-748.

[163] Perello G., Marti-Cid R., Llobet J.M., Domingo J.L., 2008. "Effects of Various Cooking Processes on the Concentrations of Arsenic, Cadmium, Mercury, and Lead in Foods," *Journal of Agricultural and Food Chemistry,* 156 (22), 11262-11269.

[164] Torres-Escribano S., Ruiz A., Barrios L., Velez D., Montoro R., 2011. "Influence of Mercury Bioaccessibility on Exposure Assessment Associated with Consumption of Cooked Predatory Fish in Spain," *Journal of the Science of Food and Agriculture,* 91 (6), 981-6.

the literature. The EPA selected the Morgan study[165] as the basis for the food preparation/cooking adjustment factor because it focused on the types of freshwater fish species representative of what might be consumed by subsistence fishing populations (*i.e.*, walleye and lake trout). This study[166] provides a range of adjustment factors for each fish type including 1.1 to 1.5 for walleye and 1.5 to 2.0 for lake trout. Given these two ranges, the EPA determined it to be reasonable to take an intermediate value between the two ranges (*i.e.*, 1.5), rather than focus on either the highest or lowest values, which is not the most conservative assumption that the EPA could have made. This study[167] also explains that preparation/cooking of fish results in an increase in MeHg levels per unit fish because Hg concentrates in the muscle, while preparation/cooking tends to reduce non-muscle elements (*e.g.*, water, bone, fat).

Regarding the alternative studies identified by the commenters, the EPA disagrees that these studies considered collectively contradict the cooking loss factor in the analysis. Specifically, the first study[168] may have included measurement of non-fish components added to dishes (*e.g.*, onions, heavy breading etc.), which could dilute the post-cooking Hg measurements and give the appearance of a cooking loss even as actual fish tissue Hg levels could have increased. In the second study,[169] the fish species are saltwater and not freshwater, and the authors note

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[165] Morgan *et al.*, 1997.

[166] *Id.*

[167] *Id.*

[168] Farias *et al.*, 2002.

[169] Perello *et al.*, 2008

that the reduction of water and fat could increase in the Hg concentration without changing absolute content. The third study focused on measurement of *bioaccessible Hg* in raw and cooked fish.[170] However, available information currently allows us to specify the risk model in terms of total Hg intake, not bioaccessible Hg, thus, this article is potentially informative for guiding future research and methods development, not the current risk assessment. The fourth study[171] found a modest but statistically insignificant increase in Hg levels for most of the cooking methods assessed, which is directionally consistent with EPA's cooking loss adjustment. The fifth study[172] only addressed the issue qualitatively, thus cannot be used for the cooking loss factor. When considered collectively, the EPA disagrees that the additional studies identified by the commenter contradict the cooking loss factor used in the risk assessment and maintains that the Morgan study[173] remains the most applicable for characterizing cooking/preparation effects on Hg concentrations in fish.

The EPA agrees that application of the cooking loss adjustment factor is appropriate if the fish consumption rates are for *as cooked* or *as consumed* and not for raw fish. Careful review of the three studies used in the risk assessment to identify subsistence fisher consumption rates suggests that all three represent annual-average daily intakes (g/day) of *as consumed* or *as cooked* fish. One study stated that

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[170] Torres-Escribano *et al.*, 2011.

[171] Armbruster *et al.*, 1988.

[172] Gutenmann *et al.*, 1991.

[173] Morgan *et al.*, 1997.

they used models of portion or meal size servings (the size of the serving the respondent regularly eats).[174] Therefore, the EPA interprets the fish consumption rates provided in this study[175] as representing *as cooked/prepared* and not for raw fish and for that reason, application of a preparation/cooking adjustment factor is required. Another study[176] used different sized models of cooked fish filets and therefore these consumption rates are also interpreted as represented *as cooked/prepared* and not raw fish. One study[177] [178]queried survey responders for meal portion or serving size and therefore, the consumption rates do represent *as cooked/prepared.* Because all three studies provide consumption rates based on *as cooked/prepared* or as consumed, it is appropriate to apply the cooking loss adjustment factor in modeling exposure.

4. Fish Consumption Rates and Fish Tissue Hg Characterization

Comment: One commenter stated that in the past the Agency has recommended various default consumption rates (in the general range of 130 to < 150 g/day) to provide default intakes for subsistence

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[174] Burger *et al.*, 2002.

[175] *Id.*

[176] Shilling, Fraser, Aubrey White, Lucas Lippert, Mark Lubell (2010). Contaminated fish consumption in California's Central Valley Delta. Environmental Research 110, p. 334-344.

[177] Dellinger JA. 2004. "Exposure assessment and initial intervention regarding fish consumption of tribal members of the Upper Great Lakes Region in the United States." *Environ Res* 95:325-340.

[178] Personal communication, Dr. Dellinger, September 27, 2011.

fishers under the *Risk Assessment Guidance for Superfund (RAGS) or the Fish Advisory Guidance.* [179] [180] The commenter stated that these default consumption rates are derived from various studies and generally are based on 90th or 99th percentile distribution estimates. Another commenter stated that EPA's use of the 99th percentile fish consumption for its risk analysis is inconsistent with the Agency's risk assessment guidelines, which recommend evaluating a reasonable maximum exposure ("RME") scenario,[181] which equates to about a 95th percentile fish consumption value. The same commenter stated that EPA applied the 99th percentile to a "small survey of 149 South Carolina female anglers" to calculate an ingestion rate of 373 grams per day (g/day). The commenter stated that if the 95th percentile is used the ingestion rate would be 173 g/day and if the default ingestion rate for determining ambient water standards is used the ingestion rate would be 142 g/day.

Several commenters stated that EPA based its fish consumption rates used in the risk analysis on a limited number of studies and that those studies are poorly documented.

Another commenter stated that EPA should summarize available supporting studies by basic study content, characteristics, design, size, demo-

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[179] U.S. EPA. 1991. *Risk Assessment Guidance for Superfund (RAGS).* Part C 1991 EPA/9285.7-01C. October.

[180] U.S. EPA. 2000. *National Guidance: Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories,* Volume 2. EPA 823-B-00-008, November.

[181] U.S. EPA. 1989. *Risk Assessment Guidance for Superfund (RAGS).* EPA/540/1-89/002. December.

graphics, dietary recall period, and fish intake rates by demographic variables. According to the commenter, this summary would support the scientific validity of the assessment and better illustrate the potential variability and uncertainty involved in extrapolating data from small populations to the national-scale. The commenter also noted that the three studies actually used to provide subsistence population estimates, which were extrapolated to the national-scale, included a limited number of individuals living in diverse and localized areas.

One commenter stated that the assumption with the greatest impact on risk is the fish consumption rate. That same commenter stated that using 99th percentile ingestion rate dramatically increases HQ and IQ loss compared to the 50th percentile ingestion rate. The commenter stated that when an estimate of the 95th percentile ingestion rate of the 15 to 44 year old female population is considered, the HQ is a tenth of the value computed with the 99th percentile high-end female fisher.

One commenter stated that EPA provides broad summary statistics of its fish tissue data in Table 5-2 of the Regulatory Impact Analysis (RIA), but the summary does not allow an assessment of the representativeness and robustness of the underlying data for the risk assessment, especially at the tails of the distribution. The commenter stated that the table does not include a median statistic and does not provide any information on the number of lakes and river segments in each watershed. According to the commenter, an analysis of EPA's database by the SAB indicated that 60 percent of the watersheds with fish Hg data from rivers have risks calculated based upon a sample size of one or two fish. The commenter stated

that it is not reasonable to base a significant policy and regulation decision on watersheds where exposure is based on a single fish sample in a single water body within it.

Several commenters criticized EPA's use of the 75th percentile fish tissue MeHg level in a watershed. One commenter stated that EPA provided no rationale for its decision to choose the highest of the 75th percentile for fish Hg levels among rivers and lakes within the HUC. Several commenters stated that subsistence fishers are less likely to target larger fish relative to recreational fishers. Several commenters suggested that EPA include a sensitivity analysis using the mean or median fish MeHg level in a watershed. One commenter also stated that EPA arbitrarily inflated the risk estimates by assuming consumption of only fish greater than 7 inches and choosing the largest of the 75th percentile of fish Hg levels from these larger fish (*i.e.*, larger than 7 inches) for rivers and lakes. That same commenter suggested using the median of all size fish, not just those over 7 inches.

One commenter stated that EPA should quantify adverse effects from the ingestion of MeHg in seafood in addition to ingestion of MeHg from self-caught freshwater fish. According to the commenter, recent studies demonstrate that were EPA to take into account consumption of seafood, MeHg consumption in the U.S. is of even greater concern.

Response: The EPA acknowledges that the focus of the Hg Risk TSD is characterizing risk for the groups likely to experience the greatest U.S. EGU-attributable Hg risk, which are subsistence fishing populations active at inland freshwater lakes and rivers. Specifically, within that subsistence fishing population, the EPA is interested in those individuals

who are most at-risk, which includes those who consume the most fish. For that reason, the EPA considered a range of high-end fish consumption rates including the 99th percentile representing the most highly-exposed individuals. In responding to the SAB peer review, the EPA clarified this focus in the introduction to the revised Hg Risk TSD and changed the full title to *revised Technical Support Document: National-Scale Assessment of Mercury Risk to Populations with High Consumption of Self-caught Freshwater Fish.*

The EPA agrees that the fish consumption rate is an important factor in calculating risk from exposure to MeHg in fish. The EPA acknowledges that the distribution of fish consumption rates is positively skewed, which means that at higher percentiles (*e.g.*, 90th, 95th, and 99th) there is a substantial increase in ingestion rates relative to the mean or median. The revised Hg Risk TSD includes a reasonableness check on the amount of fish consumed (as a daily value) reflected in the different rates. While the 99th percentile consumption rates for the subsistence female fisher (373 g/day) is substantially higher than the 90th or 95th percentile values (123 and 173 g/day respectively), the 99th percentile value translates into a 13-ounce meal. While this represents a large serving, it is still reasonable if representing an individual who receives all of their meat protein from self-caught fishing, and the 13 ounces per day do not have to be eaten all at one meal. The higher consumption rates (i.e., greater than 250 g/day) are supported by all three studies used in the risk assessment, and therefore, there is support across studies near the upper bound of likely consumption rates in this range. The EPA acknowledges uncertainty associated with estimating high-end percentile

values in these studies due to relatively low sample sizes for some population groups. However, even if a few individuals reported these high self-caught fish consumption rates, making it difficult to characterize the population percentiles they represent, the values still suggest that these levels of high fish consumption exist among surveyed individuals. To determine whether a public health hazard could exist, the EPA asserts that it is reasonable to include these consumption rates as representative of the most at-risk populations. In these cases, however, the EPA acknowledges that it is important to highlight uncertainty associated with characterizing the specific population percentile that these ingestion rates represent, and EPA has done so in the revised Hg Risk TSD.

The EPA disagrees with the comment that high consumption rates are poorly documented. Evidence of these high fish consuming populations can be

found in surveys[182] and specialized studies.[183] [184] [185] [186] [187] Several studies identified additional fishing populations with subsistence or near subsistence consumption rates, including urban fishing populations (including low-income populations),[188] [189] [190] Laotian communities,[191] and Hispanics. The EPA participated in 1999 in a project investigating exposures of poor, minority communities in New York City to a number of contaminants including Hg, which found these populations can have very high fish consumption

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[182] Burger *et al.*, 2002.

[183] Burger, J., K. Pflugh, L. Lurig, L. Von Hagen, and S. Von Hagen. 1999a. "Fishing in Urban New Jersey: Ethnicity Affects Information Sources, Perception, and Compliance." *Risk Analysis* 19(2): 217-229.

[184] Burger, J., Stephens, W. L., Boring, C. S., Kuklinski, M., Gibbons, J. W., Gochfeld M. 1999b. "Factors in Exposure Assessment: Ethnic and Socioeconomic Differences in Fishing and Soncumption of Fish Caught along the Savannah River." *Risk Analysis*, Vol. 19, No. 3, p. 427.

[185] California Environmental Protection Agency (CalEPA). 1997. *Chemicals in Fish Report No. 1: Consumption of Fish and Shellfish in California and the United States Final Draft Report.* Pesticide and Environmental Toxicology Section, Office of Environmental Health Hazard Assessment, July.

[186] Tai, S. 1999. "Environmental Hazards and the Richmond Laotian American Community: A Case Study in Environmental Justice." Asian Law Journal 6: 189.

[187] Corburn, J. 2002. "Combining community-based research and local knowledge to confront asthma and subsistence-fishing hazards in Greenpoint/Williamsburg, Brooklyn, New York." *Environmental Health Perspectives* 110(2).

[188] Burger *et al.*, 1999a.

[189] Burger *et al.*, 1999b.

[190] CalEPA, 1997.

[191] Tai, 1999.

rates.[192] The SAB concluded that the consumption rates and locations for fishing activity are supported by the data presented in the Hg Risk TSD, and are generally reasonable and appropriate given the available data.[193]

The EPA agrees that the Hg Risk TSD would be improved by clarifying that the literature review focused on identifying studies that characterize subsistence fish consumption for groups active at freshwater locations within the U.S., and EPA has revised the Hg Risk TSD accordingly. In the Hg Risk TSD, the EPA summarized important study attributes for the source studies used to obtain fish consumption rates. This information was provided in Table C-1 in an appendix. To improve clarity, the EPA moved the summary table to the main body in the revised Hg Risk TSD. In identifying these studies, the EPA focused on surveys for subsistence fishers that were applicable at the broader regional or national level. In the Hg Risk TSD, the EPA acknowledged the smaller sample sizes for some of the subsistence fisher groups, and in several cases the EPA did not use the 99th percentile consumption rates because the sample sizes were too low to support this level of resolution. This decision did not affect EPA's finding of a hazard to public health, which is based on the results for the female subsistence fishing population, which has an estimate of the 99th percentile consumption rate that is supported by an adequate sample size.

The EPA disagrees with the comment that it did not provide a rationale for choosing the 75th per centile fish tissue concentration across lakes and

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[192] Corburn, 2002.

[193] U.S. EPA-SAB, 2011.

rivers in a watershed. However, the EPA modified the methodology based on evaluation of the number of samples within each watershed (responding to a recommendation from the SAB). In the revised methodology, the EPA computes the 75th percentile value at each sampling site within a watershed. The EPA then computed the average of the site-specific 75th percentile fish tissue Hg values within a given watershed. This approach does not differentiate between rivers and lakes and reflects an improved treatment of behavior, allowing for fishers to choose among multiple fishing sites within a watershed.

The EPA generally agrees with the comment that some fraction of subsistence fishers likely consume fish without consideration for size (given dietary necessity), however, the EPA considers it reasonable to assume that a subset of subsistence fishers could target larger fish in order to maximize the potential consumption per unit of fishing effort. The EPA uses this subset of subsistence fishers targeting larger fish, which is represented by the 75th percentile fish tissue value, in the risk assessment. In addition, including the female subsistence fishing population in the analysis also provides coverage for high-end recreational anglers who target larger freshwater fish. The SAB commented that: "Using the 75th percentile of fish tissue values as a reflection of consumption of larger, but not the largest, fish among sport and subsistence fishers is a reasonable approach and is consistent with published and unpublished data on predominant types of fish consumed."[194] The SAB suggested that EPA include a sensitivity analysis based on use of the median value, and EPA has done

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[194] U.S. EPA-SAB, 2011.

so in the revised Hg Risk TSD. This sensitivity analysis showed that using the median estimates had only a small impact on the number and percent of modeled watersheds with populations potentially at-risk from U.S. EGU-attributable MeHg exposures. In the revised Hg Risk TSD, the EPA clarified that the 7-inch cutoff represents a minimum size limit for a number of key edible freshwater fish species established at the State-level. For example, Pennsylvania establishes 7 inches as the minimum size limit for both trout and salmon (other edible fish species such as bass, walleye and northern pike have higher minimum size limits).[195]

The EPA disagrees with the comment that it is not reasonable to use watersheds where only a single fish sample is available. Although it is generally preferred to have multiple samples, the SAB noted that using a single sample is likely to underestimate the 75th percentile fish MeHg concentration and is, therefore, likely to underestimate the risk estimates for those watersheds. The SAB suggested that EPA conduct additional analyses of the fish tissue MeHg data, which EPA has done and included in the revised Hg Risk TSD. The revised Hg Risk TSD includes information on the number of watersheds modeled in the risk assessment with various fish tissue Hg samples sizes (e.g., 1, 2, 3-5, 6-10 and >10 measurements).

5. Reference Dose (RfD) for MeHg and Hg Health Effects Studies

Comment: Several commenters stated that EPA's RfD[196] is based on sound science, which was supported

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[195] U.S. Environmental Protection

[196] U.S. Environmental Protection Agency—Integrated Risk Information System (U.S. EPA-IRIS). 2001. Methylmercury

by the findings of the NAS Study,[197] and that EPA appropriately applied the RfD in the Hg risk assessment. The commenters also stated that recent studies find clear associations between maternal blood Hg levels and delayed child development and cardiovascular effects, as well as potential for effects due to exposure to pollutant mixtures including lead.

However, many commenters expressed concerns regarding EPA's use of the MeHg RfD as a benchmark for health risk. Several commenters raised concerns claiming that EPA has not incorporated the best available Hg toxicological data into the RfD, which results in a flawed analysis and an overestimate of the impact of Hg emissions on human health.

Several commenters stated that, when deriving the RfD, the EPA relied on the flawed Faroe Islands' children study and ignored the Seychelles Islands study,[198] which did not confirm any harm on children due to MeHg exposure. According to the commenters, application of the Faroe Island study is suspect because (1) the raw data from the study have never been made available for independent analysis and scrutiny, (2) there is potential for confounding by polychlorinated biphenyls (PCBs) and lead, (3) population exposure to MeHg was through consumption of highly contaminated pilot whale meats and blubbers, and (4) exposure levels in the U.S. remain lower than those observed in the primary

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(MeHg) (CASRN 22967-92-6). Available at *http://www.epa.gov/iris/subst/0073.htm*.

[197] NAS, 2000.

[198] Budtz-Jorgensen E, Debes F, Weihe P, Grandjean P. 2005. "Adverse Mercury Effects in 7-Year-Old Children Expressed as Loss in "IQ"." EPA-HQ-OAR-2002-0056-6046.

study. One commenter also notes that (1) Seychelles Islanders consume far more fish than Americans do; (2) the amount of MeHg in the U.S. population is much lower than the Seychelles Islanders; and (3) all ocean fish contain about the same amount of MeHg, so MeHg intake per fish meal is similar between Americans and Seychelles Islanders. However, another commenter stated that industry arguments against using the Faroe Islands study fail to acknowledge that the study results were consistent with studies in the Seychelles Islands, New Zealand,[199] and Poland.[200]

One commenter criticized EPA for using a linear dose-response model for the RfD-based HQ metric and the IQ metric. Another commenter stated that the RfD assumes a threshold dose below which an appreciable risk of adverse effects is unlikely, and NAS did not evaluate whether MeHg exposure data were better fit by a linear or non-linear model or by a threshold or non-threshold model.

Several commenters stated that EPA's MeHg RfD is more conservative than "safe" levels determined by other federal agencies and claim that EPA assigned unusually high uncertainty factors. Several commenters stated that EPA's use of the 1999 National Health and Nutrition Examination Survey (NHANES) blood

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[199] Kjellstrom, T; Kennedy, P; Wallis, S; *et al.* 1986. *Physical and mental development of children with prenatal exposure to mercury from fish. Stage 1: Preliminary test at age 4.* Natl Swed Environ Protec Bd, Rpt 3080 (Solna, Sweden).

[200] Wieslaw Jedrychowski *et al.* 2006. "Effects of Prenatal Exposure to Mercury on Cognitive and Psychomotor Function in One-Year-Old Infants: Epidemiologic Cohort Study in Poland," 16 Annals of Epidemiology 439.

Hg levels show a downward trend since 1999, and the levels have been below the RfD since 2001.

One commenter stated that a study by Texas Department of State Health Services (DSHS, 2004)[201] determined that among subsistence fishers who eat fish from Caddo Lake with elevated MeHg, women of child-bearing years did not have blood Hg levels greater than the RfD. Thus, according to the commenter, the connection between MeHg in fish and adverse health effects in the U.S. is not fully understood and could involve other factors, including the protective effects of fatty acids and selenium in fish, which EPA did not taken into account.

Two commenters claim that EPA uses the RfD as if it were an absolute threshold for health risk in the risk assessment even though the RfD methodology is a screening tool for deciding when risks clearly do not exist.

Several commenters recommended adding qualitative discussions to the Hg Risk TSD regarding several aspects of uncertainty, including uncertainty in the RfD, uncertainty in extrapolating a dose-response relationship between MeHg exposure and change in IQ, uncertainty in extrapolating the dose-response relationship from marine fish and marine mammals to freshwater fish, and uncertainty due to potential confounding by PCBs in marine species.

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[201] DSHS. 2005. *Health Consultation: Mercury Exposure Investigation Caddo Lake Area-Harrison County Texas.* Agency for Toxic Substances and Disease Registry. *http://www.tceq.state.tx.us/assets/public/comm_exec/pubs/sfr/085.pdf.*

Several commenters raised concerns regarding the relationship between MeHg exposure and IQ loss. Two commenters stated that changes in IQ are not a well-defined health consequence of MeHg exposure. One commenter stated that the SAB had reservations about EPA's use of IQ loss. Two commenters questioned whether IQ impacts would even occur because in Japan and Korea, where the maternal blood Hg levels are higher than in the U.S., there is no evidence of adverse effects. Another commenter cited a study that found verbal IQ scores for children from mothers with no seafood intake were 50 percent more likely to be in the lowest quartile. One commenter questions using an IQ risk metric threshold of >1 or >2 points because variation in IQ measures and the intra-individual variation in IQ are higher than the threshold.

Several commenters question the relationship between cardiovascular effects and MeHg exposure. Two commenters cited studies examining the relationship between MeHg exposure and cardiovascular

effects,[202] [203] [204] [205] [206] [207] [208] but concluded that it seems premature to use these studies to establish a dose-response relationship.

Several commenters assert that the risks from eating seafood are low relative to the benefits, that fish advisories can limit the beneficial aspects of fish consumption, and that fish advisories are often unsuccessful in changing behavior.[209] [210] One commenter

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[202] Hibbeln JR, Davis JM, Steer C, Emmett P, Rogers I, Williams C, *et al.*, 2007. "Maternal seafood consumption in pregnancy and neurodevelopmental outcomes in childhood (ALSPAC study): an observ-ational cohort study. " Lancet 369:

[203] Roman HA, Walsh TL, Coull BA, Dewailly E, Guallar E, Hattis D, *et al.*, 2011. Evaluation of the Cardiovascular Effects of Methylmercury Exposures: Current Evidence Supports Development of a Dose-Response Function for Regulatory Benefits Analysis. Environ Health Perspect 119:607-614.

[204] Guallar E, Sanz-Gallardo MI, van't Veer P, *et al.*, 2002. "Mercury, fish oils, and the risk of myocardial infarction." N Engl J Med.;347:1747.

[205] Virtanen JK, Voutilainen S, Rissanen TH, *et al.*, 2005. "Mercury, fish oils, and risk of acute coronary events and cardiovascular disease, coronary heart disease, and all-cause mortality in men in eastern Finland." Arterioscler Thromb Vasc Biol. 2005;25:228.

[206] Yoshizawa, Rimm, Morris, Spate, Hsieh, Spiegelman, Stampfer, Willett. "Mercury and the Risk of Coronary Heart Disease in Men," N Engl J Med 2002; 347:1755-1760.

[207] Hallgren CG, Hallmans G, Jansson JH, *et al.*, 2001. Markers of high fish intake are associated with decreased risk of a first myocardial infarction. Br J Nutr: 86:397.

[208] Mozaffarian, Dariush. 2011. "Mercury Exposure and Risk of Cardiovascular Disease in Two U.S. Cohorts," N Engl J Med 364: 1116-1125.

[209] Hibblen *et al.*, 2011.

[210] Mozaffarian, *et al.*, 2011.

noted the important protective role of dietary selenium against MeHg toxicity because the binding affinity of Hg to Se is much higher than binding to sulfur.

Response: The EPA agrees with commenters that state the MeHg RfD is the appropriate health value for determining elevated risks from MeHg exposure and disagrees with commenters that state otherwise. At this time, the EPA is neither reviewing nor revising its 2001 RfD for MeHg. The 2001 RfD for MeHg is EPA's current peer-reviewed RfD, which is the value EPA uses in all its risk assessments. The EPA's RfD is based on multiple benchmark doses, and RfDs were calculated on various endpoints using the three extant large studies of childhood effects of in utero exposure: Faroe Islands, New Zealand, and an integrative measure including data from Seychelles. The EPA did not choose to base the MeHg RfD solely on results from the Seychelles Islands, as both the NAS[211] and an independent scientific review panel convened as part of the IRIS process[212] advised strongly against using results from a study that at the time had not shown an association between MeHg exposure and adverse effects. Further, the EPA disagrees with comments stating that EPA based the MeHg RfD solely on results from the Faroe Islands population and disagrees that the information underlying the RfD is "poorly explained". The EPA has provided detailed documentation for the choices

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[211] NAS, 2000.

[212] U.S. EPA. 2001b. Responses to Comments of the Peer Review Panel and Public Comments on Methylmercury. Available on the Internet at *http://www.epa.gov/iris/supdocs/methpr.pdf.*

underlying calculation of the RfD.[213] [214] [215]To correct a misunderstanding by the commenter, the data underlying the Faroe Islands study have been previously published in the peer reviewed literature.

The EPA disagrees that it did not incorporate the latest Hg data to support the appropriate and necessary finding. It is the policy of EPA to use the most current peer reviewed, publicly available data and methodologies in its risk assessments. However, the EPA noted in the preamble to the proposed rule that "data published since 2001 are generally consistent with those of the earlier studies that were the basis of the RfD, demonstrating persistent effects in the Faroe Island cohort, and in some cases associations of effects with lower MeHg exposure concentrations than in the Faroe Islands. These new studies provide additional confidence that exposures above the RfD are contributing to risk of adverse effects, and that reductions in exposures above the RfD can lead to incremental reductions in risk." However, the EPA has not completed a comprehensive review of the new literature, and as such, it would be premature to draw conclusions about the overall implications for the RfD.

The EPA agrees that EPA's RfD is not the same as the levels used by other federal agencies. In their

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[213] U.S. EPA, 2001a. Water Quality Criterion for the Protection of the Human Health: MethylmercuryEPA-823-T-01-001, available at *http://water.epa.gov/scitech/swguidance/standards/criteria/aqlife/pollutants/methylmercury/index.cfm.*

[214] U.S. EPA-IRIS, 2001.

[215] Rice D, Schoeny R, Mahaffey K. 2003. "Methods and Rationale for Derivation of a Reference Dose for Methylmercury by the U.S. EPA." Risk Analysis 23(1)107-115.

advice to the EPA on the appropriate bases for a MeHg RfD, NAS specifically recommended that EPA use neither the study nor the uncertainty factor employed by the Agency for Toxic Substances Disease Registry (ATSDR) in the calculation of the minimal risk level.[216]

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The EPA disagrees that the uncertainty factor is "unusually high". The uncertainty factor used in calculation of EPA's peer-reviewed RfD is small (10 fold); half of this factor is to account for measured variability in human pharmacokinetics, which is based on advice of the NAS[217] and an independent panel of scientific peer reviewers convened as part of the IRIS process.[218]

The IRIS makes this statement regarding a threshold for MeHg, "It is also important to note that no evidence of a threshold arose for methylmercury-related neurotoxicity within the range of exposures in the Faroe Islands study. This lack [of a threshold] is indicated by the fact that, of the K power models, K = 1 provided a better fit for the endpoint models than did higher values of K."[219]

The EPA disagrees that it is using the MeHg RfD as an absolute bright line for health effects in the risk assessment. As stated in the preamble to this proposed rule, the RfD is an estimate of a daily exposure to the human population that is likely to be without an appreciable risk of deleterious effects during a lifetime. The EPA also stated that no RfD defines an

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[216] NAS, 2000.

[217] *Id.*

[218] U.S. EPA, 2001b.

[219] U.S. EPA-IRIS, 2001.

exposure level corresponding to zero risk. Because mercury is a cumulative neurotoxin, it is important to distinguish health effects from public health hazard. Within the context of the appropriate and necessary finding, we interpret a public health hazard as risk, rather than certain occurrence of health effects.

The EPA disagrees that exposure levels in the U.S. are lower than those in the Faroe Islands study. Exposure to MeHg in the U.S. has been reported at the same levels as those published in the Faroe Islands.[220] One study notes that in the NHANES data (1999 to 2004), the highest five percent of women's blood Hg exceeded 8.2 microgram per liter ([mu]g/L) in the Northeast U.S. and 7.2 [mu]g/L in coastal areas.[221]Higher levels have been reported among subjects known to consume fish. For example, one study reported mean blood Hg for adult women to be 15 [mu]g/L; range for men and women was 2 to 89.5 [mu]g/L.[222] Note that some publications have reported Hg effects in U.S. populations at or below the current

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[220] Schober Susan E, Sinks Thomas H, Jones Robert L, Bolger P Michael, McDowell Margaret, Osterloh John, Garrett E Spencer, Canady Richard A, Dillon Charles F, Sun Yu, Joseph Catherine B, Mahaffey Kathryn R. Blood mercury levels in U.S. children and women of childbearing age, 1999-2000. JAMA. 2003 Apr 2; 289(13): 1667-1674.

[221] Mahaffey, K.R., R.P. Clickner and R.A. Jeffries. 2009. Adult Women's Blood Mercury Concentrations Vary Regionally in the U.S.: Association with Patterns of Fish Consumption (NHANES 1999-2004). *Environ. Health Perspect.*, 117: 47-53.

[222] Hightower Jane M, Moore Dan. Mercury levels in high-end consumers of fish. Environ Health Perspect. 2003 Apr; 111(4): 604-608.

U.S. RfD.[223] [224]Also, the EPA disagrees with the commenter stating all ocean fish throughout the world contain about the same amount of MeHg. Marine fish in commerce differ widely in Hg concentration by species, and fish within the same species but caught at different locations have variable amounts of Hg in their tissues.[225] [226]

The EPA disagrees that there is a statistically discernible downward trend in the NHANES data on blood Hg. The EPA is unaware that a formal statistical analysis for temporal trends has been completed for NHANES data on blood Hg levels for the period 1999 to 2008. Mahaffey*et al.*, evaluating NHANES data collected 1999 to 2004 for women at child-bearing age, could "not support the conclusion that there was a general downward trend in blood Hg concentrations

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[223] Oken, E., Radesky, J.S., Wright, R.O., Bellinger, D.C., Amarasiriwardena, C.J., Kleinman, K.P., Hu, H., Gillman, M.W. 2008. Maternal fish Intake during Pregnancy, Blood Mercury Levels, and Child Cognition at Age 3 Years in a U.S. Cohort. *American Journal of Epidemiology, 167(10),* 1,171-1,181.

[224] Lederman, Sally Ann Robert L. Jones, Kathleen L. Caldwell, Virginia Rauh, Stephen E. Sheets, Deliang Tang, Sheila Viswanathan, Mark Becker, Janet L. Stein, Richard Y. Wang, and Frederica P. Perera. 2008. Relation between Cord Blood Mercury Levels and Early Child Development in a World Trade Center Cohort. *Environmental Health Perspectives* 118(8) 1085-1091.

[225] Hisamichi Y, Haraguchi K, Endo T. 2010. "Levels of mercury and organochlorine compounds and stable isotope ratios in three tuna species taken from different regions of Japan." *Environ Sci Technol* 44(15): 5971-8.

[226] Sunderland EM. 2007. "Mercury exposure from domestic and imported estuarine and marine fish in the U.S. seafood market." *Environ Health Perspect.* 115(2): 235-42. Epub 2006 Nov 20.

over the 6-year study period."[227] However, the same publication noted that "there was a decline in the upper percentiles reflecting the most highly exposed women" having blood Hg concentration greater than established levels of concern. Visual observations of the data show a slight decrease in Hg blood level concentrations from 1999-2008 at the geometric mean, but this decrease may not be statistically significant. The EPA remains concerned that substantial numbers of women of childbearing age in the U.S. may have blood Hg levels that are equivalent to exposures at or above the RfD. While mean and 95th percentiles from recent NHANES data are below the blood Hg concentration equivalent to the RfD, blood levels for some portions of the population (high consumers of fish, for example) show exposures above this level. One study estimated very high blood Hg levels at the 99th percentile for females of child-bearing age.[228] Other published studies have shown that various population

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[227] Mahaffey, K.R., R.P. Clickner and R.A. Jeffries. 2009. Adult Women's Blood Mercury Concentrations Vary Regionally in the U.S.: Association with Patterns of Fish Consumption (NHANES 1999-2004). *Environ. Health Perspect.*, 117: 47-53.

[228] Tran, N.L., L. Barraj, *et al.*, 2004. "Combining food frequency and survey data to quantify long-term dietary exposure: a methyl mercury case study." *Risk Anal* 24(1): 19-30.

groups can have high blood Hg levels.[229] [230] [231] [232] [233] For example, one study found that 83 percent of the NHANES Asian population exceeded the RfD-equivalent blood mercury level.[234]

The EPA disagrees with the commenter regarding confounding by PCBs and lead. Exposure to MeHg in the Faroe Islands was largely from consumption of pilot whale meat; exposure to PCBs was found in the portion of the population who also consume whale blubber. Numerous analyses have shown neurobehavioral effects of PCBs; however, the effects of MeHg and PCB in the Faroe Islands study are separable.[235] The EPA also documented the independence of PCB and MeHg effects in the Faroe Islands population.[236] The National Institute of Environmental Health Sciences (NIEHS) concluded that both PCB and Hg had adverse effects.[237] The NAS

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[229] *Id.*

[230] Miranda, M.L., S. Edwards, *et al.*, 2011. "Mercury levels in an urban pregnant population in Durham County, North Carolina." *Int J Environ Res Public Health* 8(3): 698-712.

[231] Hightower and Moore, 2003.

[232] Hightower, J.M., A. O'Hare, *et al.*, (2006). "Blood mercury reporting in NHANES: identifying Asian, Pacific Islander, Native American, and multiracial groups." Environ Health Perspect 114(2): 173-175.

[233] McKelvey, W., R.C. Gwynn, *et al.*, 2007. "A biomonitoring study of lead, cadmium, and mercury in the blood of New York city adults." Environ Health Perspect 115(10): 1435-1441.

[234] Hightower*et al.*, 2006.

[235] NAS, 2000.

[236] U.S. EPA, 2001a.

[237] National Institute of Environmental Health Sciences (NIEHS). 1998. Scientific issues relevant to assessment of health effects from exposure to methylmercury. Workshop organized by

concluded that there was no empirical evidence or theoretical mechanism to support the opinion that *in utero* Faroese exposure to PCBs exacerbated the reported MeHg effect.[238] A second set of analyses found that the effect of prenatal PCB exposure was reduced when the data were sorted into tertiles by cord PCB concentrations.[239] These analyses support a conclusion that there are measurable effects of MeHg exposure in the Faroese children that are not attributable to PCB toxicity. We also note that there was no report of lead exposure in the Faroe Islands population.

The EPA disagrees with the commenter's assertion that the connection between MeHg in fish and observed health effects is not understood due to evidence from the cited Texas study.[240] This is an exposure study rather than a study on measures of neurobehavioral or any other health endpoint. TCEQ noted that none of the Caddo Lake study participants had blood Hg levels above the benchmark dose level (BMDL) of 5.8 [mu]g/L (one of the several used by EPA in the calculation of the MeHg RfD). The BMDL is not a "no effect" level. Rather it is an effect level for a percentage of the population. The EPA has noted in correspondence with TCEQ that, as an exposure study, the Caddo Lake study may be representative of the surrounding population; however, the sample size

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Committee on Environmental and Natural Resources (CENR) Office of Science and Technology Policy (OSTP), The White House, November 18-20, 1998, Raleigh, NC.

[238] NAS, 2000.

[239] Budtz-Jorgensen, E., N. Keiding, and P. Grandjean. 1999. Benchmark modeling of the Faroese methylmercury data. Final Report to U.S. EPA.

[240] DSHA, 2005.

is very small. It is not appropriate to extrapolate from Caddo Lake to larger regional or national populations.

The EPA is aware of the possibility of both interactions among environmental contaminants and cumulative effects of pollutants that produce the same adverse endpoint. The EPA guidance exists for dealing with such scenarios.[241] [242] [243] [244] The Agency's concern with the likelihood of human exposure to multiple contaminants is reflected in the multi-chemical scope of the rulemaking. However, the EPA focused the technical analyses supporting the proposed regulation on effects of individual pollutants rather than cumulative effects.

The EPA disagrees with commenters suggesting that the RfD-based HQ is inappropriate. The SAB "agreed that EPA's calculation of a hazard quotient for

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[241] U.S. EPA. 1986. *Guidelines for the Health Risk Assessment of Chemical Mixtures.* U.S. Environmental Protection Agency, Office of Research and Development, Washington, DC September. EPA/630/R-98/002. Available at *http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=2256.*

[242] U.S. EPA. 1999. *Guidance for Performing Aggregate Exposure and Risk Assessments.* U.S. Environmental Protection Agency, Office of Pesticide Programs, Washington, DC October. Available at *http://www.pestlaw.com/x/guide/1999/EPA-19991029A.html.*

[243] U.S. EPA. 2000a. *Supplementary Guidance for Conducting Health Risk Assessment of Chemical Mixtures.* U.S. Environmental Protection Agency, Risk Assessment Forum, Washington, DC EPA/630/R-00/002. Available at *http://www.epa.gov/ncea/raf/pdfs/chem_mix/chem_mix_08_2001.pdf.*

[244] U.S. EPA. 2003a. Framework for Cumulative Risk Assessment. Risk Assessment Forum, U.S. Environmental Protection Agency. Washington, DC EPA/630/P-02/001F. EPA/600/P-02/001F. Available at *http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=54944.*

each watershed included in the assessment is appropriate as the primary means of expressing risk," and that "because the RfD from which the HQ is calculated is an integrative metric of neurodevelopmental effects of methylmercury, it constitutes a reasonable basis for assessing risk."[245]

The SAB also recommended that EPA revise the Hg Risk TSD to include additional qualitative discussion about uncertainty in the revised Hg Risk TSD. Specifically, the SAB recommended that EPA revise the Hg Risk TSD "to better explain the methods and choices made in the analysis, and analytical results, and where the uncertainties lie." The SAB noted several uncertainties related to the RfD. The EPA agrees with this recommendation and included a more complete discussion of these uncertainties in the revised Hg Risk TSD.

The EPA disagrees that the IQ metric threshold is questionable. The SAB concluded that it was reasonable to consider a loss of >1 or >2 IQ points a public health concern. The SAB stated, "The Panel agreed that if IQ loss is retained in the risk assessment despite these reservations, a loss of one or two points would be an appropriate benchmark."[246] The SAB further comments in their report: "The consensus is that if IQ were to be used, then a loss of 1 or 2 points as a population average is a credible decrement to use for this risk assessment. This metric seems to be derived from the lead literature and was peer reviewed by the Clean Air Scientific Advisory

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[245] U.S. EPA-SAB, 2011.

[246] U.S. EPA-SAB, 2011.

Committee (U.S. EPA CASAC 2007).[247] Although its applicability to methylmercury is questionable, the size of the decrement is justified based on the extensive analyses available from the literature reviewed by CASAC."[248] As noted in other studies,[249] [250] a decrease of 1-2 points at the mean results in a much larger decrease in those with IQs that are much lower or higher than the mean.

Although EPA disagrees that the IQ results are too uncertain to rely upon, the EPA acknowledges that IQ is not the most sensitive neurodevelopmental endpoint affected by MeHg exposure, as also noted by the SAB. The SAB recommended that the IQ analyses be retained but be de-emphasized in the documentation underlying the final regulation. The SAB concluded, "The Panel does not consider it appropriate to use IQ loss in the risk assessment and recommended that this aspect of the analysis be de-emphasized, moving it to an appendix where IQ loss is discussed along with

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[247] U.S. Environmental Protection Agency—Science Advisory Board (U.S. EPA-SAB). 2007. *Clean Air Scientific Advisory Committee's (CASAC) Review of the 1st Draft Lead Staff Paper and Draft Lead Exposure and Risk Assessments.* EPA-CASAC-07-003. March. Available on the internet at *http://yosemite.epa.gov/sab/sabproduct.nsf/989B57DCD436111B852572AC0079DA8A/$File/casac-07-003.pdf.*

[248] U.S. EPA-SAB, 2011.

[249] Axelrad, D. A.; Bellinger, D. C.; Ryan, L. M.; Woodruff, T. J. 2007. "Dose-response relationship of prenatal mercury exposure and IQ: An integrative analysis of epidemiologic data." *Environmental Health Perspectives,* 115, 609-615.

[250] Bellinger DC. 2005. *Neurobehavioral Assessments Conducted in the New Zealand, Faroe Islands, and Seychelles Islands Studies of Methylmercury Neurotoxicity in Children.* Report to the U.S. Environmental Protection Agency. EPA-HQ-OAR-2002-0056-6045.

other possible endpoints not included in the primary assessment. While the Panel agreed that the concentration-response function for IQ loss used in the risk assessment is appropriate, and no better alternatives are available, IQ loss is not a sensitive response to methylmercury and its use likely underestimates the impact of reducing methylmercury in water bodies."[251] The EPA is following the SAB's recommendation by deemphasizing the IQ analysis and placing that analysis in an appendix to the revised Hg Risk TSD.

The SAB, however, supported the use of the IQ dose-response function calculated by EPA in the Hg Risk TSD. The SAB noted, "The function used came from a paper by Axelrad and Bellinger (2007) that seeks to define a relationship between methylmercury exposure and IQ. A whitepaper by Bellinger (Bellinger, 2005)[252] describes the sequence of steps in relating methylmercury exposure to maternal hair mercury and then that to IQ. The Mercury Risk TSD furthers notes that IQ has shown utility in describing the health effects of other neurotoxicants. These are appropriate bases for examining a potential impact of reducing methylmercury on IQ, but the SAB does not consider these compelling reasons for using IQ as a primary driver of the risk assessment." [253]

The EPA disagrees that the Agency has overstated or failed to review the scientific literature on cardiovascular effects from MeHg exposure. As summarized in the preamble to the proposal, the EPA stated that the NAS study concluded that "Although the

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[251] U.S. EPA-SAB, 2011.

[252] Bellinger, 2005.

[253] U.S. EPA-SAB, 2011.

data base is not as extensive for cardiovascular effects as it is for other end points (*i.e.*, neurologic effects) the cardiovascular system appears to be a target for MeHg toxicity in humans and animals."[254] The EPA also stated that additional cardiovascular studies have been published since 2000. The EPA did not develop a quantitative dose response assessment for cardiovascular effects associated with MeHg exposures, as there is no consensus among scientists on the dose-response functions for these effects, and there is inconsistency among available studies as to the association between MeHg exposure and various cardiovascular system effects. In the future, the EPA may update the MeHg RfD and will review all of the relevant scientific literature available at that time, including data on all relevant endpoints, and weight of evidence for likelihood that MeHg produces specific effects in humans.

The EPA acknowledges the research regarding the effectiveness of fish advisories. However, the proposed regulation does not address the subject of fish advisories, consumer advice on fish or efficacy of such advice. The EPA rejects the commenter's speculation regarding whether the estimated IQ impacts for the regulation are real. Adverse effects of *in utero* Hg exposure have been reported in populations in the U.S. n255[255] [256] In another study on neurobehavioral effects of prenatal exposure to MeHg through maternal consumption of seafood, adverse effects are observed for MeHg even without controlling for fish

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[254] *76 FR 25001.*

[255] Oken *et al.*, 2008.

[256] Lederman *et al.*, 2008.

consumption.[257] That study suggests that at normal Japanese dietary intake of MeHg and fish nutrients, the overall effect is adverse. While Japanese fish consumption and Hg exposure are both somewhat higher than the mean U.S. exposure, these levels are still within the distribution of U.S. consumers.

Moreover, many studies show that beneficial effects of fish on both cardiovascular and neurodevelopmental health are decreased by concomitant exposure to MeHg. Several studies describe one or more aspects of exposure to fish nutrients and MeHg.[258] [259] [260] [261] [262] [263]

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[257] Suzuki, K., Nakai, K., Sugawara, T., Nakamura, T., Ohba, T., Shimada, M., Hosokawa, T., Okamura, K., Sakai, T., Kurokawa, N., Murata, K., Satoh, C., and Satoh, H. 2007. "Neurobehavioral effects of prenatal exposure to methylmercury and PCBs, and seafood intake: neonatal behavioral assessment scale results of Tohoku study of child development." *Environ Res* 110, 699-704.

[258] Grandjean P, Bjereve K, Wihe P, and Sterewald u. 2001a. "UBirthweight in a fishing community: significance of essential fatty acids and marine food contaminants." *In. J. Epidemiol.* 30:1272-1278.

[259] Budtz-Jorgensen, E.; Grandjean, P.; Weihe, P. 2007. "Separation of risks and benefits of 16 seafood intake." *Environmental Health Perspectives.* Vol. 115, 323-327.

[260] Choi *et al.*, 2008a.

[261] Choi *et al.*, 2008b.

[262] Oken *et al.*, 2008.

[263] Strain, J.J. *et al.*, 2008. Associations of maternal long chain polyunsaturated fatty acids, methyl mercury, and infant development in the Seychelles Child Development Nutrition Study." *Neurotoxicology.* 29(5): 776-782.

[264] Recent studies[265] [266] [267]and analyses indicate the potential for nutrients in fish (particularly marine fish) to mask some of the observed adverse effects of MeHg. Because EPA did not adjust for potential confounding by nutrients in marine fish and mammals, the benchmark doses used in the RfD derivation may be underestimated.

The EPA recognizes the potential for confounding of the effects of Hg on the developing nervous system by a range of nutrients and discusses this uncertainty in the revised Hg Risk TSD. Regarding selenium, the SAB commented that "one SAB member suggests the use of blood markers of selenium-dependent enzyme function, noting that methylmercury irreversibly inhibits selenium-dependent enzymes that are required to support vital-but-vulnerable metabolic pathways in the brain and endocrine system. Impaired selenoenzyme activities would be observed in the blood before they would be observed in brain, but the effect is also expected to be transitory. The use of these measures is a minority view among the SAB members."[268] The SAB did not express a consensus recommendation on adjustments to the risk estimates for exposure to selenium or other nutrients, noting

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[264] Suzuki, *et al.*, 2007.

[265] Oken *et al.*, 2008.

[266] Choi AL, Cordier S, Weihe P, Grandjean P. 2008a. "Negative confounding in the evaluation of toxicity: the case of methylmercury in fish and seafood." *Crit Rev Toxicol.* 2008;38(10):877-93.

[267] Choi AL, Budtz-Jorgensen E, Jorgensen PJ, Steuerwald U, Debes F, Weihe P, Grandjean P. 2008b. "Selenium as a potential protective factor against mercury developmental neurotoxicity." *Environ Res.* May;107(1):45-52. Epub 2007 Sep 12.

[268] U.S. EPA-SAB, 2011.

that "there is not enough known about their quantitative impact to support a recommendation of a reanalysis."[269]

6. General Comments on Hg Risk Assessment

Comment: Several commenters generally supported the Hg risk assessment, but several other commenters generally disagreed with the Hg risk assessment. One supporter stated that EPA reasonably determined that Hg emissions pose a public health hazard, correctly requested peer review of Hg risk analysis and correctly concluded EGU-attributable MeHg poses a hazard to public health at watersheds when considering all sources of Hg deposition and U.S. EGUs alone. Two commenters noted that the contribution of U.S. EGUs to total Hg deposition can significantly contribute to hundreds of watersheds, and U.S. EGU deposition alone may endanger sensitive populations near many of these watersheds.

Several commenters claimed that overly conservative assumptions in the risk analysis render the results flawed and unreliable, including using CMAQ to model deposition, Mercury Maps, fish consumption rate and fish MeHg concentrations, overly stringent RFD, national-scale model, using poverty as a surrogate for subsistence fishing, assuming a subsistence fisher resides in most watersheds with fish tissue data, fishers only eat larger fish with high Hg concentrations, cooking loss adjustment, unrealistically high fish ingestion rates (a large fish meal every day), focused on the extremes of the distributions, cast many assumptions as an underestimate of the effect despite evidence to the contrary, and created inappropriate metrics for risk that show

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[269] *Id.*

no improvement despite significant Hg emissions reductions in the U.S.

Several commenters cite Tetra Tech's analysis that assessed Hg risk using different consumption rates, cooking factor, mean fish tissue concentrations, and EGU-attributable Hg deposition only, which showed considerably fewer watersheds that exceed an HQ of 1 at 2016 deposition levels.

Several commenters claim that this regulation would not significantly reduce Hg exposure via fish consumption because EGU-attributable deposition is a small fraction of total deposition. One commenter stated that EPA's data shows Hg emissions from U.S. EGUs have little influence on fish Hg concentrations despite a reduction of 41 tons of Hg in the U.S. between 2005 and 2016. One commenter requested that EPA accurately describe the low health risks posed by utility hazardous air pollutant emissions. One commenter stated that EPA did not consider scientific information showing that there is no straightforward connection between Hg emissions from U.S. EGUs to the Hg level in fish, which is dependent upon many environmental factors, such as sunlight and organic matter, pH, water temperature, sulfate, bacteria, and zooplankton present in the ecosystem. One commenter stated that there is not any demonstrable evidence that anyone in the U.S. has suffered adverse health problems as a result of Hg emissions from coal-fired EGUs. One commenter stated that EPA's findings are similar to the 2000 findings where EPA found a plausible link between anthropogenic emissions of Hg from sources in the U.S. and MeHg in fish, and "plausible" is a euphemism for unproven.

Several commenters had recommendations for the Hg risk analysis. One commenter stated that more data from Florida should have been included because Florida is known to have a rich data set on fish Hg concentrations. One commenter stated that EPA should characterize general recreational angler fishers instead of subsistence fishers. One commenter claims that EPA made math errors in the Hg Risk TSD regarding the deposition in watersheds at specific percentiles. One commenter questioned EPA's policy metrics used to characterize Hg risk.

Several commenters stated that the Hg TSD is unclear and lacks detail, as noted by the SAB. One commenter stated that the SAB is critical of EPA's efforts, stating that the SAB found it difficult to evaluate the risk assessment based solely upon Hg Risk TSD and recommended that EPA transparently explain the methods and uncertainties. One commenter stated that because of insufficient review time and the lack of detail in the Hg Risk TSD, they could not assess key questions, such as the nation-wide representativeness of the fish tissue data.

One commenter stated the subset of watersheds considered in the analysis (*i.e.*, with fish tissue data) have clearly higher U.S. EGU-attributable deposition than the distribution of all watersheds.

One commenter stated EPA's reporting of IQ point loss is erroneous and not relevant to informing policy, and the U.S. EGU contribution to risk is marginal as evidenced by the null values for the 50th percentile watershed.

One commenter notes that U.S. EGU-attributable emissions of Hg have decreased significantly between

2005 and 2016, but claims that this decrease does not appear to affect the risk results.

Response: The purpose of the Hg risk assessment is not to assess the magnitude of risk reduction under the proposed rule, but rather to estimate the magnitude of absolute risk attributable to U.S. EGUs currently and following implementation of other applicable CAA requirements. That said, any potential risk reductions following implementation of the MACT rule itself would likely reflect a number of factors besides the national average U.S. EGU deposition value cited by the commenter. These additional factors include: (a) Spatial gradients in the magnitude of absolute U.S. EGU-attributable Hg deposition, (b) spatial gradients in the magnitude of reductions in Hg deposition linked to the rule, (c) availability of measured fish tissue Hg levels in the vicinity of U.S. EGUs experiencing larger Hg emission reductions to support risk modeling, and (d) the potential for subsistence fishing activity at watersheds in the vicinity of U.S. EGUs experiencing larger reductions in Hg emissions (also required to support risk modeling). It is also important to point out that while the national average U.S. EGU-attributable Hg deposition (for the 2016 scenario—see revised Hg Risk TSD) is two percent, values range up to 11 percent for the 99th percentile watershed. This illustrates the substantial spatial variation in U.S. EGU-attributable Hg deposition, which translates into spatial variation in the magnitude of U.S. EGU-attributable subsistence fisher risk.

The SAB conducted a comprehensive peer review of all of EPA's assumptions in the Hg Risk TSD, and concluded that "the SAB supports the overall design of and approach to the risk assessment and finds that it

should provide an objective, reasonable, and credible determination of the potential for a public health hazard from Hg emitted from U.S. EGUs."[270] Furthermore, the SAB concluded, "The SAB regards the design of the risk assessment as suitable for its intended purpose, to inform decision-making regarding an "appropriate and necessary finding" for regulation of hazardous air pollutants from coal and oil-fired EGUs, provided that our recommendations are fully considered in the revision of the assessment."[271] Although the SAB did indicate difficulty in evaluating the risk assessment based solely on the Hg Risk TSD, the panel obtained additional information from EPA through the peer review process and determined that "the SAB supports the overall design of and approach to the risk assessment and finds that it should provide an objective, reasonable, and credible determination of the potential for a public health hazard from mercury emitted from U.S. EGUs."[272] The primary advice of the SAB panel was that EPA should "revise the Technical Support Document to better explain the methods and choices made in the analysis, and analytical results, and where the uncertainties lie."[273] The EPA has revised the Hg Risk TSD as part of the final rulemaking to address the SAB's recommendations and has made that revised Hg Risk TSD available in the rule docket.

The SAB concurred with EPA's analytical assumptions and overall study design for the Hg Risk TSD, including the RfD-based HQ approach, fish tissue

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[270] U.S. EPA-SAB, 2011.

[271] *Id.*

[272] *Id.*

[273] *Id.*

data, 75th percentile size fish, Mercury Maps assumption, and consumption rates. Based on the SAB peer review, the EPA strongly disagrees with commenter statements that the results reported in the Hg Risk TSD are unreliable, overly conservative, extreme, inconsistent with EPA risk guidelines, or severely overstate risk based on the stated objectives of the analysis. The EPA has specifically addressed each of these assumptions in the previous sections of the preamble, and thus, does not repeat those responses here. Based on the review by the SAB, the EPA has accurately described the health risks posed by utility hazardous air pollutant emissions and disagrees with the commenter's statement that EPA has not provided any demonstrable evidence to show that adverse health risks exist. The EPA has applied peer reviewed modeling to estimate the deposition of Hg attributable to U.S. EGUs. The EPA asserts that these metrics demonstrate a clear hazard to public health from Hg emissions from U.S. EGUs.

The EPA thoroughly evaluated the Tetra Tech analysis. The EPA does not agree that the analysis by Tetra Tech uses assumptions that are "more reasonable", and the SAB agreed that all of EPA's assumptions in the Hg Risk TSD are reasonable and appropriate. The EPA asserts that Tetra Tech's analysis does not fully cover subsistence fishers likely to experience elevated U.S. EGU-related Hg exposure. Specifically, the risk estimate cited in the comment reflects application of a number of behavioral assumptions that provide significantly less coverage for higher risk subsistence fishers. Fish consumption surveys cited in the revised Hg Risk TSD suggest that higher percentile subsistence fishers eat more than twice the level of fish assumed by Tetra Tech. Tetra Tech's analysis also used the median fish

tissue levels, but it is reasonable to assume that subsistence fishers would target somewhat larger fish to maximize the volume of edible meat per unit time spent fishing. Tetra Tech's analysis also assumed that cooking fish did not concentrate Hg, but a number of studies discussed in the revised Hg Risk TSD explicitly provide adjustment factors involving a higher unit concentration following preparation. Taken together, Tetra Tech's analysis does not address the stated goal of the risk assessment to assess the nature and magnitude of risk for those individuals likely to experience the greatest risk associated with exposure to U.S. EGU-attributable Hg.

The EPA disagrees with the commenter's assertion that this rule will not affect risks associated with Hg exposure. Hg from U.S. EGUs contributes to the levels of MeHg in fish across the country and consumption of contaminated fish can lead to increased risk of adverse health effects. The EPA has shown in the RIA (Chapter 5) that this rule will reduce Hg levels in fish.

The EPA acknowledges that U.S. EGUs contribute only a small fraction of total Hg deposition in the U.S. However, U.S. EGUs remain the largest emitter of Hg in the U.S., and the revised Hg Risk TSD shows that U.S. EGU-attributable Hg deposition results in up to 29 percent of modeled watersheds with populations potentially at-risk. Our analyses show that of the 29 percent of watersheds with population at-risk, in 10 percent of those watersheds U.S. EGU deposition alone leads to potential exposures that exceed the MeHg RfD, and in 24 percent of those watersheds, total potential exposures to MeHg exceed the RfD and U.S. EGUs contribute at least 5 percent to Hg deposition. Mercury risk is increasing for exposures above the RfD, and as a result, any

reductions in Hg exposures in locations where total exposures exceed the RfD can result in reduced risks. While these reductions in risk may be small for most populations and locations, in some watersheds and for some populations, reductions in risk may be greater.

The SAB also directly addressed the question of the nation-wide representativeness of the fish tissue MeHg data in the national Hg risk assessment. The SAB concluded, "Although the SAB considers the number of watersheds included in the assessment adequate, some watersheds in areas with relatively high mercury deposition from U.S. EGUs were under-sampled due to lack of fish tissue methy[l]mercury data. The SAB encourages the Agency to contact states with these watersheds to determine if additional fish tissue methylmercury data are available to improve coverage of the assessment."[274] In response to the SAB's recommendations, the EPA obtained additional fish tissue sample data from several states, particularly Pennsylvania, Wisconsin, Minnesota, New Jersey, and Michigan. This additional data increased the total number of watersheds assessed in the analysis by 33 percent nationally. In Florida, the EPA assessed the Hg-related health risk for 40 watersheds. Because EPA did not find any additional fish tissue data for watersheds in Florida that could be incorporated into the analysis, the total number of watersheds in Florida assessed in the revised Hg Risk TSD remains the same as the Hg Risk TSD at proposal.

The EPA disagrees with the commenter that there were errors in the Hg Risk TSD. Instead, the commenter has misinterpreted how EPA calculated

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[274] U.S. EPA-SAB, 2011.

the percentiles. The percentile (and mean) values presented in Table ES-1 for total and U.S. EGU-attributable Hg deposition are not matched by watershed. In other words, the EPA queried for the percentiles (and mean) provided for total Hg deposition and presented those percentiles and then separately estimated the percentiles for U.S. EGU-attributable Hg. Therefore, the total and U.S. EGU-attributable values for the 99th percentile do not necessarily occur at the same watershed. The EPA has provided additional clarification in the revised Hg Risk TSD.

The EPA agrees with the commenter that MeHg levels in fish depend on a complicated set of environmental factors, and EPA acknowledged this in the revised Hg Risk TSD. Furthermore, the EPA acknowledges that total Hg fish tissue levels are not correlated with levels of total Hg deposition when looking across watersheds because this relationship is highly dependent on the methylation potential at the specific waterbody, which is affected by pH, sulfate deposition, turbidity, etc. However, several recent studies[275] [276] [277] show, and the SAB agrees, that it is appropriate for EPA to assume that changes in Hg deposition are linearly associated with *changes* in fish tissue concentration. In addition, the EPA agrees that the subset of watersheds in the risk analysis have somewhat higher U.S. EGU deposition than the distribution of all watersheds, but EPA disagrees that oversampling of high deposition watersheds is inappropriate.

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[275] Orihel *et al.*, 2007.

[276] Orihel *et al.*, 2008.

[277] Harris *et al.*, 2007.

The EPA does not agree that there is no improvement in fish Hg concentrations between 2005 and 2016, or that there will be no further improvement from decreasing Hg emissions from U.S. EGUs from the baseline in 2016. Although total risk from all Hg exposures will remain elevated in much of the U.S., much of that risk is associated with global, non-U.S. Hg emissions. U.S. EGUs remain the largest source of Hg emissions in the U.S., and reductions in those emissions will result in reduced Hg deposition in many highly impacted watersheds. As shown in the revised Hg Risk TSD, average U.S. EGU-attributable fish tissue Hg concentrations is estimated to decrease by 44 percent between 2005 and 2016. Although we did not remodel risk for the 2005 scenario in the revised Hg Risk TSD, we estimated at proposal that the total percent of modeled watersheds with populations potentially at-risk from Hg emissions from U.S. EGUs exceeding either risk metric (*i.e.*, U.S. EGUs alone or total potential exposures to MeHg exceed the RfD and U.S. EGUs contribute at least 5 percent) would decline from 62 percent in 2005 to 28 percent in 2016. This projected decline is primarily due to a combination of additional pollution control technologies installed to comply with federal regulations, such as CSAPR, and changing fuels, such as the shift to natural gas.

The EPA disagrees that IQ loss is erroneous or irrelevant to informing policy, but EPA has moved that analysis to an appendix in the revised Hg Risk TSD, per the SAB's recommendation. The EPA disagrees that the IQ effects at the 50th percentile watershed are useful in determining that there is not a hazard to public health because EPA's stated goal of the risk assessment was to focus on populations likely to experience relatively higher exposures to U.S. EGU-attributable Hg.

We also disagree with those commenters that point to the SAB's statements concerning the clarity of the Hg Risk TSD to suggest that the public did not have an ample opportunity to comment on the Hg risk assessment. Although it is correct that the SAB said the Hg Risk TSD was difficult to evaluate until EPA staff explained it at the public meeting in June 2011, we note that the commenters that assert that this issue amounts to a violation of CAA section 307(d) notice requirements made detailed technical comments, including many of the same comments as the SAB. Furthermore, the EPA provided notice of the peer review in the preamble to the proposed rule and a number of **Federal Register** notices advised the public of the peer review process and all the meetings were open to the public for comment and participation and the minutes of those meetings were posted on the SAB Web site. The minutes for the June 2011 meeting, during which EPA provided clarifying information, were available well within the public comment period for the proposed rule. For these reasons, we maintain that the public was provided an adequate opportunity to comment on the Hg risk assessment.

e. Non-Hg HAP Case Studies

1. Emissions for Non-Hg Case Studies

Comment: The commenters raised concerns about a wide variety of aspects of EPA's approach for emissions used for the non-Hg case studies, including the use of an arithmetic mean for computing emission factors for representing emissions of untested units, the suggestion of statistical outliers in the Cr test data, the claim that metals content of the fuel is an indicator of flawed test data, the statistical approaches used by EPA to create emission factors, the absence in EPA's approach of an equation that commenters

claim better represents emissions values, that EPA's approach to estimate Cr(VI) is flawed, and the lack of coal rank as a delineating factor for emission factor calculation. The commenters also suggested that EPA should revise stack parameters used for the case studies based on better available data.

Response: In response to the comments on the emission factors, the EPA has undertaken additional analysis to address all commenter concerns. The EPA disagrees with commenter's criticisms of emission factors based on arithmetic means, and EPA demonstrates that the use of an arithmetic mean provides the most representative result. The EPA analysis has found that the geometric mean approach recommended by the commenter always under predicts actual emissions by an average of more than seventy percent. The EPA agrees with commenters' recommendations to use statistical outlier tests, but has applied tests different from those suggested by the commenters. As further explained in the response to comments document in the docket, this approach did not eliminate the Cr test data from the Cr emission factors used for some of the case study emissions.

The EPA disagrees with commenters' assertions that the metal content of the coal is a basis for invalidating the test results of high Cr emissions. The identification of sources whose measured emissions do not match the commenters' preconceived idea of emissions behavior is not surprising. There are many possible explanations for these differences. For example, the inconsistency between the test data and the coal analysis could be due to any number of reasons including unrepresentative coal sampling, control device problems, degradation of the refractory, or sampling contamination. The idea that test data

should be discarded because it does not match initial expectations is unfounded.

The EPA disagrees with the commenter recommendations for using an equation from AP-42, developed in part by the commenters. Based on analyses of metal emissions measured at the site compared to statistically predicted estimates, the EPA concluded that measured emissions test data better predict actual emissions, and emission factors based on the arithmetic mean are a reasonable method to estimate emissions when test data are not available. The EPA analysis of the ICR data has found that the emissions equation recommended by the commenter is not a good predictor of actual EGU emissions. The EPA also disagrees with commenters' concerns about the assumption that 12 percent of the Cr will be Cr(VI) for every coal-fired unit, which was specifically supported by the peer review on the approach for estimating cancer risks associated with Cr and Ni emissions. The EPA disagrees with the commenter's assertion that any impact of scrubbers will impact the case study analyses. In EPA's revised case study analysis, 6 facilities have risk greater than 1 in a million, and of these, four facilities have Cr as the risk driver (James River, Conesville, TVA Gallatin, and Dominion—Chesapeake Bay). For these facilities, none of the units contributing the bulk of the Cr emissions have scrubbers according to the data provided to EPA by those facilities, so scrubber impacts on Cr speciation is not relevant to EPA's conclusions based on the non-Hg case studies. In any case, the EPA disagrees with the commenter's conclusions about the impacts of scrubbers on Cr speciation and provides evidence that impacts of scrubbers on Cr speciation can have the opposite effect

on Cr(VI) fractions, concluding that EPA's 12 percent assumption is somewhat conservative.

The EPA also disagrees that coal rank must be a factor in computing Cr emission factors for use in the case studies. The EPA's analysis has demonstrated that coal rank appears to play no role in non-Hg metals emissions. The EPA's newly revised emissions factor development procedures can isolate and compare subgroups based on control device type or coal rank; the ICR data were subjected to these tests and no statistical significance was found between coal rank groups.

Finally, the EPA agrees with one commenter's recommendations on revised stack parameters for the case studies and has included these revisions in the case study modeling for the final rule.

2. General Comments on Non-Hg Risk Case Study

Comment: One commenter stated that EPA's case study assessment reaffirms the need to regulate HAP emitted by both coal and oil-fired EGUs. The commenter noted that over 40 percent of the case studies conducted by EPA to quantify health hazards associated with the inhalation of non-Hg HAP indicated a cancer risk greater than or equal to the one in a million threshold level required to delist a source category under CAA section 112.

One commenter stated that EPA's case study assessment might be flawed by the use of "beta" tests versions of the AERMOD meteorological preprocessors (AERMINUTE and AERMET). The commenter obtained from EPA the meteorological data used for EPA's assessment of the Conesville facility and processed these data with EPA's current regula-

tory versions of these preprocessors, which differ from the beta version. According to the commenter, a comparison of the hourly wind speed and hourly wind direction data produced by the beta preprocessor and by current EPA preprocessors revealed numerous and often substantial disparities.

One commenter stated that EPA's finding that only three coal-fired facilities and one oil-fired facility out of roughly 440 coal-fired facilities and 97 oil-fired facilities in the U.S. indicated risk greater than one-in-a-million supports a finding that it is "appropriate" to regulate those four and not the other 537. Another commenter stated that EPA found only a "few" facilities that have estimated maximum cancer risks in excess of one in a million, and that this does not justify regulating all non-Hg HAP for all sources in this category.

One commenter stated that EPA's discussion in the preamble to the proposed rule misleads the reader into believing that non-Hg HAP emissions from EGUs are associated with serious human health effects. According to the commenter, the EPA's discussion of the effects associated with excessive exposure to an individual HAP would lead the reader to believe that those effects inevitably occur from EGU emissions because EGU emissions have trace amounts of non-Hg HAP.

One commenter stated that with the assumptions in the Utility Study, both in terms of conservative scientific estimates and overestimated amounts of oil burned by these units, the EPA concluded that the risks from oil-fired units would result in only one new cancer case every 5 years. The commenter does not believe that this level of risk warrants regulation under CAA section 112(n)(1)(A).

Several commenters stated that even if the additional studies EPA performed were accurate, they hardly demonstrate that it is necessary and appropriate to regulate coal-fired EGU HAP under CAA section 112 because three sites nationwide show risks greater than one in a million, with the highest at eight in a million.

One commenter stated that the highest cancer risk estimated for coal-fired EGUs is still within the acceptable range used by EPA in other programs and is also far less than the background exposure risks the average person experiences. The background risk of developing cancer in a lifetime is approximately one in three (0.33). According to EPA's own data, the predicted added cancer risk of exposure to HAP from U.S. EGUs would change the background risk from 0.33 to 0.330001. This level of change is so minimal that it could not be observed in any health effects study that might be conducted.

One commenter stated that EPA conducted a health risk assessment on a limited number of facilities and found a "few" facilities that have estimated maximum cancer risks in excess of one in a million. The commenter stated that, based on this limited health risk assessment, the EPA apparently decided that they were justified to regulate all non-Hg HAP for all sources in this category.

Several commenters stated that EPA's assumption implies that a person stays exactly at the center of a census tract for 70 years and that a unit will operate in exactly the same manner for 70 years is unrealistic. The commenters suggest that Tier 3 risk assessment is warranted or a lifetime exposure adjustment is needed.

One commenter asserts that because the alleged health benefits are derived from total exposure, the EPA should explain how its numerical emission limit units, which would not directly restrict total exposure if heat inputs increase, redress this health concern. In its preamble, the EPA simply notes that its emission limit units are consistent with, and allow for simple comparison to, other regulations.

One commenter questioned whether acid gas emissions limits for oil-fired units are "appropriate" or "necessary" because EPA's new technical analyses do not indicate a health concern from acid gas emissions from oil-fired units. According to the commenter, the EPA identifies Ni as the main HAP of concern from oil-fired units, even though cancer-related inhalation risks were well below the RfCs and EPA states that significant uncertainty remains as to whether those emissions present a health concern.

Response: The EPA agrees with the commenter that the non-Hg HAP risk assessment confirms the appropriate and necessary finding.

The EPA disagrees that EPA's case study assessment is flawed by the use of beta versions of AERMINUTE and AERMET. The EPA remodeled the case study facilities using the current versions of AERMINUTE (version 11059), AERMET (version 11059), and AERMOD (version 11103). Although there were differences in the number of calm and missing winds in the current AERMINUTE/AERMET output compared to the beta version, the resulting risks differed by less than two percent, on average. For Conesville, which had the largest difference in calms between the beta and current versions of AERMINUTE/AERMET, the risks differed by three percent. For the final rule, the case study facilities

have been modeled with the current available versions of AERMINUTE, AERMET, and AERMOD.

The EPA disagrees with the commenter that having only a few case study facilities exceeding one in a million risk invalidates the "appropriate finding". The 16 facilities EPA selected as case studies for assessment may not represent the highest-emitting or highest-risk sources. Although case study facility selection criteria included high estimated cancer and non-cancer risks using the 2005 NEI data, high throughput, and minimal emission control, another necessary criterion was the availability of Information Collection Request (ICR) data for the EGUs at those facilities (or for similar EGUs at other facilities). Because the ICR data were collected for the purpose of developing the MACT standards, the ICR was targeted towards better performing sources for non-Hg metal HAP, acid gas HAP, and organic HAP, with a smaller set of random recipients. Therefore, facilities for which ICR data were available may not represent the highest-emitting sources. The EPA's assessment of the case study facilities for the proposed rule concluded that three coal-fired facilities and one oil-fired facility had estimated lifetime cancer risks greater than one in a million. For the final rule, revisions were made to the 16 case studies based on comments received, and the results indicate that 5 coal-fired facilities and 1 oil-fired facility had estimated lifetime cancer risks greater than 1 in a million. The EPA maintains that its finding that more than 30 percent of the case study facilities had a cancer risk greater than one in a million is sufficient to support the appropriate finding.

The EPA disagrees with the commenter's assertion that the health effects associated with exposures

to non-Hg HAP from U.S. EGUs are mischaracterized in the preamble to the proposed rule. The discussion of the health effects of non-Hg HAP provided in the preamble includes general information on the potential health effects associated with a broad range of exposure concentrations (from low to high levels) of the various non-Hg HAP (some of which have been determined to be carcinogenic to humans) based on peer reviewed scientific information extracted from priority sources such as IRIS, Cal EPA and ATSDR health effects assessments.

The EPA disagrees with the commenter's characterization of the Utility Study. The Utility Study represented the highest-quality factual record of information available at the time regarding EGU emissions and risks. Further, the EPA's revised risk assessments of 16 case studies, performed with more recent data and refined scientific methods, indicate that there are six U.S. EGU facilities that pose estimated inhalation cancer risks greater than 1 in a million. The EPA maintains that the findings of the case studies are one element that independently supports our determination that it remains appropriate and necessary to regulate EGUs under CAA section 112.

The EPA does not agree with the commenter who suggested that EPA should interpret the results of the non-Hg HAP risk analysis in the context of background cancer risk. As explained in the preamble to the proposed rule, the EPA reasonably looked to the cancer risk threshold established under CAA section 112(c)(9)(B)(1) for delisting a source category as an indicator of the level of cancer risk that was appropriate to regulate under CAA section 112. The commenters comparison of the cancer risk from EGUs

as compared with the risk of contracting cancer from unknown sources is not the standard Congress established for evaluating HAP emission risk and the commenter has provided no support for its contention that the Agency should evaluate risk in that manner. The EPA maintains that the analysis was reasonable.

The EPA does not agree with the commenter's implication that EPA must make a facility-specific finding for each HAP for each source and then only regulate individual EGU facilities for the individual HAP that identified as causing an identified hazard to public health or the environment. That approach is not required under CAA section 112(n)(1) or anywhere under CAA section 112, and it would be virtually impossible to undertake such an effort. For these reasons, the EPA does not agree with the commenter and maintains that the appropriate and necessary finding is reasonably supported by the record and consistent with the statute for all the reasons set forth in the preamble to the proposed rule and this final action.

The EPA disagrees that an exposure adjustment is needed to account for conditions changing over 70 years because it runs counter to the long-standing approach that EPA has taken to estimate the maximum individual risk, or MIR. The MIR is defined by EPA's Benzene NESHAP regulation of 1989[278] and codified by CAA section 112(f) as the lifetime risk for a person located at the site of maximum exposure 24 hours a day, 365 days a year for 70 years (*e.g.*, census block centroids). The MIR is the metric associated with the determination of whether or not a source category may be delisted from regulatory consideration under

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[278] *54 FR 38044.*

CAA section 112(c)(9). The MIR is the risk metric used to characterize the inhalation cancer risks associated with the case study facilities. The EPA used the annual average ambient air con-centration of each HAP at each census block centroid as a surrogate for the lifetime inhalation exposure concentration of all the people who reside in the census block. The EPA has used this approach to estimate MIR values in all of its risk assessments to support risk-based rulemakings under CAA section 112 to date.

The EPA disagrees with the commenter's assertion that the numerical emission limits being promulgated in today's final rule must be justified on their ability to redress the health concerns that were identified as the basis for regulating EGUs. The emission limits in today's rule are technology-based, as prescribed under CAA section 112, and do not need to be justified based on their ability to protect public health. Regarding potential health concerns, the EPA has up to 8 years after the promulgation of the technology-based emission limits for EGUs to determine whether the regulations protect public health with an ample margin of safety. If the regulations do not, the CAA directs EPA to promulgate additional more stringent standards (within the prescribed 8 years) to achieve the appropriate level of public health protection.

Furthermore, the EPA reasonably concluded that it was appropriate and necessary to regulate oil-fired EGUs in 2000, and EPA confirmed that conclusion was proper with the analysis set forth in the preamble to the proposed rule. Certain commenters question the determination based on their views of how the Agency can and should exercise its discretion. The EPA disagrees with these commenters and stands by the determination for the reasons set forth in the

preamble to the proposed rule. The EPA also stands by the determination that the maximum cancer risks posed by emissions of oil-fired EGUs are greater than one in a million, due primarily to emissions of Ni compounds. Based on our analysis, we are unable to delist oil-fired EGUs.

3. Ni Risk

Comment: Several commenters stated that the assumptions regarding the speciation and carcinogenic potential of Ni compounds used in EPA's inhalation risk assessment of the case study facilities are overly conservative and likely to overstate the risks. With respect to Ni speciation, the commenters stated that there are substantial uncertainties regarding the species of Ni being emitted and the risk of such emissions, and that EPA has made ultraconservative assumptions aimed at overestimateing the risk. The commenters stated that assigning the same carcinogenic potency of Ni subsulfide to other forms of Ni is overly conservative and inconsistent with the best available evidence.

Response: The EPA disagrees with the commenters' assertion that it is impossible to give an accurate assessment of the risks to human health from Ni emissions from EGUs, and maintains that its assessment of the potential inhalation risks from EGU emissions of Ni compounds is scientifically valid, reasonable, and based on the best-available current scientific understanding. To that end, in July 2011, the EPA completed an external peer review (using three independent expert reviewers) of the methods used to evaluate the risks from Ni and Cr compounds emitted by EGUs.[279] There were two charge questions relating

[279] U.S. EPA, 2011c.

to Ni in that review. First, do EPA's judgments related to speciated Ni emissions adequately take into account available speciation data, including recent industry spectrometry studies? Second, based on the speciation information available and what is known about the health effects of Ni compounds, and taking into account the existing URE values (*i.e.*, values derived by the Integrated Risk Information System,[280] California Department of Health Services,[281] and the Texas Commission on Environmental Quality[282]), which of the following approaches to derive unit risk estimates would result in a more accurate and defensible characterization of risks from exposure to Ni compounds?

1. To continue using the same approach as that developed for use in the 2000 NATA, which consists of using the IRIS URE for nickel subsulfide and assuming that nickel subsulfide constitutes 65 percent of the mass emissions of all Ni compounds.

2. To consider a more health-protective approach, based on the consistent views of the most authoritative scientific bodies (*i.e.*, NTP in their 12th ROC, IARC, and other international agencies) that consider Ni compounds to be carcinogenic as a group.

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[280] *U.S.* EPA, 1991.

[281] California Department of Health Services (CDHS) 1991. Health Risk Assessment for Nickel. Air Toxicology and Epidemiology Section, Berkeley, CA. Available online at *http://oehha.ca.gov/air/toxic_contaminants/html/Nickel.htm.*

[282] Texas Commission on Environmental Quality (TCEQ), 2011. Development Support Document for nickel and inorganic nickel compounds. Available online at *http://www.tceq.state.tx.us/assets/public/implementation/tox/dsd/final/june11/nickel_&_compounds.pdf.*

3. To make the same assumptions as in option 2, but considering alternative UREs derived by the CDHS or TCEQ.

In responding to these peer review questions, two of the reviewers agreed with the views of the most authoritative scientific bodies, which consider Ni compounds carcinogenic as a group. These reviewers, therefore, did not focus on the availability of Ni speciation profile data. The third reviewer recommended that EPA review several manuscripts on Ni speciation profiles showing that sulfidic Ni compounds (which the reviewer considered as the most potent carcinogens) are present at low levels in emissions from EGUs.

Nickel and Ni compounds have been classified as human carcinogens by national and international scientific bodies including the IARC,[283] the World Health Organization,[284] and the European Union's Scientific Committee on Health and Environmental Risks.[285] In their *12th Report of the Carcinogens*, the NTP has classified Ni compounds as known to be human carcinogens based on sufficient evidence of

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[283] International Agency for Research on Cancer (IARC), 1990. IARC monographs on the evaluation of carcinogenic risks to humans. *Chromium, nickel and welding.* Vol. 49. Lyons, France: International Agency for Research on Cancer, World Health Organization Vol. 49:256.

[284] International Labour Organization/United Nations Environment Programme, World Health Organization (WHO), 1991. Nickel. In Environmental Health Criteria No 108 Geneva.

[285] European Commission, Scientific Committee on Health and Environmental Risks (SCHER), 2006. Opinion on: Reports on Nickel, Human Health part. SCHER, 11th plenary meeting of 04 May 2006 *http://ec.europa.eu/health/ph_risk/committees/04_scher/docs/scher_o_034.pdf.*

carcinogenicity from studies in humans showing associations between exposure to Ni compounds and cancer, and supporting animal and mechanistic data. More specifically, this classification is based on consistent findings of increased risk of cancer in exposed workers, and supporting evidence from experimental animals that shows that exposure to an assortment of Ni compounds by multiple routes causes malignant tumors at various organ sites and in multiple species. The *12th Report of the Carcinogens* states that the "combined results of epidemiological studies, mechanistic studies, and carcinogenesis studies in rodents support the concept that Ni compounds generate Ni ions in target cells at sites critical for carcinogenesis, thus allowing consideration and evaluation of these compounds as a single group"[286] Although the precise Ni compound (or compounds) responsible for the carcinogenic effects in humans is not always clear, studies indicate that Ni sulfate and the combinations of Ni sulfides and oxides encountered in the Ni refining industries cause cancer in humans. There have been different views on whether or not Ni compounds, as a group, should be considered as carcinogenic to humans. Some authors believe that water soluble Ni, such as Ni sulfate, should not be considered a human carcinogen, based primarily on a negative Ni sulfate 2-year NTP rodent bioassay (which is different than the positive 2-year

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[286] NTP, 2011.

NTP bioassay for Ni subsulfide).[287] [288] [289] Although these authors agree that the epidemiological data clearly supports an association between Ni and increased cancer risk, they sustain that the data are weakest regarding water soluble Ni. A recent review[290] highlights the robustness and consistency of the epidemiological evidence across several decades showing associations between exposure to Ni and Ni compounds (including Ni sulfate) and cancer.

Based on the views of the major scientific bodies mentioned above, and those of expert peer reviewers that commented on EPA's approaches to risk characterization of Ni compounds, the EPA considers all Ni compounds to be carcinogenic as a group and does not consider Ni speciation or Ni solubility to be strong determinants of Ni carcinogenicity. With regards to non-cancer effects, comparative quantitative analysis

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[287] Oller A. Respiratory carcinogenicity assessment of soluble nickel compounds. Environ Health Perspect. 2002, 110:841-844.

[288] Heller JG, Thornhill PG, Conard BR. New views on the hypothesis of respiratory cancer risk from soluble nickel exposure; and reconsideration of this risk's historical sources in nickel refineries. J Occup Med Toxicol. 2009, 4:23.

[289] Goodman JE, Prueitt RL, Thakali S, and Oller AR. The nickel iron bioavailability model of the carcinogenic potential of nickel-containing substances in the lung. Crit Rev Toxicol. 2011, 41:142-174.

[290] Grimsrud TK and Andersen A. Evidence of carcinogenicity in humans of water-soluble nickel salts. J Occup Med Toxicol. 2010. 5:1-7. Available online at *http://www.ossup-med.com/content/5/1/7.*

across Ni compounds indicates that Ni sulfate is as toxic or more toxic than Ni subsulfide or Ni oxide.[291] [292]

Regarding the second charge question, two of the reviewers suggested using the URE derived by TCEQ for all Ni compounds as a group, rather than the one derived by IRIS specifically for Ni subsulfide. The third reviewer did not comment on alternative approaches. The EPA decided to continue using 100 percent of the current IRIS URE for Ni subsulfide because IRIS values are at the top of the hierarchy with respect to the dose response information used in EPA's risk characterizations, and because of the concerns about the potential carcinogenicity of all forms of Ni raised by the major national and international scientific bodies. Nevertheless, taking into account that there are potential differences in toxicity and/or carcinogenic potential across the different Ni compounds, and given that there have been two URE values derived for exposure to mixtures of Ni compounds that are 2-3 fold lower than the IRIS URE for Ni subsulfide, the EPA also considers it reasonable to use a value that is 50 percent of the IRIS URE for Ni subsulfide for providing an estimate of the lower end of a plausible range of cancer potency values for different mixtures of Ni compounds.

4. Cr Risk

Comment: One commenter stated there are several problems with EPA's analysis related to the fact that Cr emissions were evaluated as being entirely Cr(VI).

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[291] Haber LT, Allen BC, Kimmel CA. Non-Cancer Risk Assessment for Nickel Compounds: Issues Associated with Dose-Response Modeling of Inhalation and Oral Exposures. Toxicol Sci. 1998. 43:213-229.

[292] NTP, 1996.

The commenter stated that not all of the emitted Cr will remain in the hexavalent form by the time it reaches the target population, and that some may be converted to the much less toxic (and noncarcinogenic) trivalent species. The commenter also stated that the concentration levels considered in the case study assessment are far below occupational levels. The commenter concluded that EPA's cancer estimates should, therefore, be looked on with some skepticism. Another commenter stated that EPA's estimate of 12 percent Cr(VI) from coal-fired EGUs is unsupported, and that EPA failed to recognize that Cr(VI) is highly water-soluble and is easily reduced to Cr(III) in the presence of SO_2 in a low pH environment. The resulting Cr(III) would be expected to precipitate out in a FGD. The commenter stated that the actual amount of Cr(VI) that would be present in the emissions from an EGU with a wet scrubber is likely to be far lower than the 12 percent estimate made by EPA.

Several commenters questioned the validity of the chronic inhalation study by EPA because of (1) the use of surrogate speciated Cr emissions data instead of actual emissions data, (2) the assumption that units were run 100 percent of the time which is impossible, (3) dispersion modeling was used that is biased towards over predicting downwind impacts, and (4) estimated ambient concentrations were utilized as substitutes for real exposure concentrations for all people within a census block.

Response: The EPA disagrees with the commenters' assertion that all Cr was considered to be hexavalent. As discussed in "Methods to Develop Inhalation Cancer Risk Estimates for Chromium and Nickel

Compounds,"[293] existing test data for utility and industrial boilers indicate that Cr(VI) is, on average, 12 percent of total Cr from coal-fired boilers. This document underwent peer review by three external reviewers, and all three reviewers considered EPA's use of the values to be reasonable given the limited data available for Cr speciation profiling. The EPRI inhalation study for coal-fired boilers also used the 12 percent value.

The EPA also disagrees that units were assumed to operate 100 percent of the time. The dispersion modeling performed for the case study facilities used hourly heat input as a temporalization factor for estimating hourly emissions, and in some cases hourly heat inputs (and emissions) were zero or very low. The commenter provided no data or information to support their claim that the dispersion modeling EPA used is biased towards overestimating downwind impacts.

The EPA disagrees with the commenters' assertion that "real exposure concentrations for all people within a census block" must be considered because it runs counter to the long-standing approach that EPA has taken to estimate the maximum individual risk, or MIR. The MIR is defined by EPA's Benzene NESHAP regulation of 1989[294] and codified by CAA section 112(f) as the lifetime risk for a person located at the site of maximum exposure 24 hours a day, 365 days a year for 70 years (*e.g.*, census block centroids). The MIR is the metric associated with the determination of whether or not a source category may be delisted from regulatory consideration under CAA section 112(c)(9). The MIR is the risk metric used to

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[293] U.S. EPA, 2011c.

[294] *54 FR 3804.*

characterize the inhalation cancer risks associated with the case study facilities. The EPA used the annual average ambient air concentration of each HAP at each census block centroid as a surrogate for the lifetime inhalation exposure concentration of all the people who reside in the census block. The EPA has used this approach to estimate MIR values in all of its risk assessments to support risk-based rule-makings under CAA section 112 to date.

5. Acid Gas Risk

Comment: One commenter stated that acid gas emissions from oil-fired EGUs are not of the magnitude that triggered EPA's decision to regulate EGUs in general, raising the question of whether reduction (or even total elimination) of acid gas emissions from oil-fired EGUs could have any significant effect on EPA's goals of reducing non-cancer health risk or acidification of sensitive ecosystems in the U.S.

Several commenters stated that acid gas concentrations estimated in the case study facility assessment and the Utility Study do not exceed human health thresholds of concern. Two commenters stated that HCl emissions are negligible compared to other primary emissions (such as SO[2]) that can lead to potential acidification of ecosystems.

Response: We do not agree with commenter's implication that Congress intended EPA to regulate only those HAP emissions from U.S. EGUs for which an appropriate and necessary finding is made, and commenter has cited no provision of the statute that states a contrary position. The EPA concluded that we must find it "appropriate" to regulate EGUs under CAA section 112 if we determine that a single

HAP emitted from EGUs poses a hazard to public health or the environment. If we also find that regulation is necessary, the Agency is authorized to list EGUs pursuant to CAA section 112(c) because listing is the logical first step in regulating source categories that satisfy the statutory criteria for listing under the statutory framework of CAA section 112. *See New Jersey, 517 F.3d at 582* (stating that "[s]ection 112(n)(1) governs how the Administrator decides whether to list EGUs * * *"). As we noted in the preamble to the proposed rule, D.C. Circuit precedent requires the Agency to regulate all HAP from major sources of HAP emissions once a source category is added to the list of categories under CAA section 112(c). *National Lime Ass'n v. EPA, 233 F.3d 625, 633 (D.C. Cir. 2000). 76 FR 24989.* The EPA discusses in the preamble to the proposed rule and this final action its concerns with HCl and other acid gas HAP emissions from EGUs and the Agency's approach for establishing section 112(d) standards for acid gas HAP.

6. EPRI Risk Analysis

Comment: Two commenters stated that a comprehensive tiered inhalation risk assessment (the EPRI study) using EPA-prescribed methods with improved emission factors, fuel data, and confirmed stack parameters did not identify significant health risks (cancer or non-cancer) among U.S. coal-fired power plants (as they existed in 2007). The commenters noted that these results contrast with those presented by EPA for its non-Hg case studies on 16 (15 coal-fired) power plants. The commenters stated that several issues appear to underlie these differences, indicating the need for EPA to reevaluate its assessment and to undertake more refined (Tier 3)

risk assessment for any facility of concern. Several commenters stated that for non-Hg HAP EPA produced one study on chronic inhalation risk assessment that identified three sites with cancer risks greater that one in a million for Cr(VI), which was authored by EPA staff and not peer reviewed. One commenter stated that EPA study is based on misinformation and overestimates assumptions, and that EPA has no data demonstrating health impacts from EGU emissions of non-Hg HAP, or the benefit from reducing such emissions. Two commenters stated that no benefits will be derived from the non-Hg HAP emission reductions associated with the proposed rule because no non-Hg HAP health risks were proven, and that no showing was made that EGU non-Hg HAP emission levels reach levels associated with adverse health effects. Another commenter stated that EPA must complete a comparable and separate national-scale risk assessment for non-Hg metals in order to determine appropriateness of proposing emissions standards for non-Hg metals.

Response: The commenters are incorrect in the assertion that EPA's case studies were performed with less rigor than the EPRI analysis. The EPRI analysis used a tiered approach to risk assessment, beginning with Tier 1 using EPA's SCREEN3 dispersion model on all 470 coal-fired power plants in the U.S., and following with Tier 2 with EPA's Human Exposure Model (which uses the AERMOD dispersion model) for plants with higher risks from the Tier 1 modeling. Although tiered risk assessment is an appropriate approach, the Tier 2 modeling could have been more refined. For example, more meteorological data could have been used and building downwash could have been considered. The EPRI analysis ostensibly concluded that the Tier 2 modeling with HEM was

conservative, and that because the modeled risks did not exceed certain thresholds, no further refinement was necessary. However, such refinements could result in higher modeled risks than those from the commenter's Tier 2 modeling.

The EPA's dispersion modeling of the case study facilities was actually performed with a greater degree of refinement than the EPRI analysis, and was consistent with EPA's *Guideline on Air Quality Models.*[295]

In contrast to the approach used in the EPRI analysis, the EPA used:

(1) 5 years of recent meteorological data from the weather station nearest to each facility, rather than one year of meteorological data. This is more representative of long-term (*i.e.*, lifetime) exposures and risks.

(2) Temporally-varying emissions based on continuous emissions monitoring data, rather than assuming a constant emission rate for each facility throughout the entire simulation.

(3) Building downwash, where appropriate.

(4) The latest version of AERMOD [version 11103].

The EPA's assessment of the case study facilities for the proposed rule concluded that three coal-fired facilities and one oil-fired facility had estimated lifetime cancer risks greater than one in a million. For the final rule, revisions were made to the case studies based on comments received, and the results indicate that five coal-fired facilities and one oil-fired facility

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[295] Appendix W to 40 CFR Part 51.

had estimated lifetime cancer risks greater than one in a million.

Regarding peer review, the risk assessment methodology used by EPA for the case studies was consistent with the method that EPA uses for assessments performed for Risk and Technology Review rulemakings, which underwent peer review by the Science Advisory Board in 2009.[296] The SAB issued its peer review report in May 2010. The report generally endorsed the risk assessment methodologies used in the program. In addition, in July 2011, the EPA completed a letter peer review of the methods used to develop inhalation cancer risk estimates for Cr and Ni compounds.

f. Ecosystem Impacts From HAP

Comment: Two commenters assert that EPA is not justified in regulating acid gases based on concern about the potential that acid gases contribute to ecosystem acidification rather than concerns about hazards to public health. The commenters further claim that HCl's contribution to ecosystem acidification is de minimis. The commenters point out that EPA acknowledges uncertainty in quantification of acidification and EPA relies on recently published research[297] that is irrelevant to the question since it is based on research conducted in the peat bog ecosystem in the United Kingdom. Another commenter calls attention to several new studies published in a special

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[296] U.S. EPA-SAB, 2010.

[297] Evans, Chris D., Don T. Monteith, David Fowler, J. Neil Cape, and Susan Brayshaw. 2011. "Hydrochloric Acid: An Overlooked Driver of Environmental Change." *Environmental Science & Technology* 45 (5), 1887-1894.

issue of the journal *Ecotoxicology* devoted to the effects of MeHg on wildlife.

Response: Although EPA agrees that quantification of acidification effects has remaining uncertainty, the science and methodology has progressed in recent years. Based on recent peer reviewed research including Evans et al.,[298] acid gases can significantly contribute to acidification. The EPA published a comprehensive risk assessment of acidification effects of nitrogen and sulfur deposition[299] and a policy assessment.[300] Given the extent and importance of the sensitive ecosystems evaluated in the review of nitrogen and sulfur deposition any substance that contributes to further acidification must be considered to be affecting the public welfare. The EPA disagrees that the peer reviewed study mentioned by commenter by Evans *et al.*, (2011) is not relevant to U.S. ecosystems. The paper presents evidence that show (1) that HCl is highly mobile in the environment, transferring acidity easily through soils and water,

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[298] *Id.*

[299] U.S. Environmental Protection Agency (U.S. EPA). 2009. *Risk and Exposure Assessment for Review of the Secondary National Ambient Air Quality Standards for Oxides of Nitrogen and Oxides of Sulfur (Final).* EPA-452/R-09-008a. Office of Air Quality Planning and Standards, Research Triangle Park, NC. September. Available on the Internet at *http://www.epa.gov/ttn/naaqs/standards/no2so2sec/data/NOxSOxREASep2009MainContent.pdf.*

[300] U.S. Environmental Protection Agency (U.S. EPA). 2011d. *Policy Assessment for the Review of the Secondary National Ambient Air Quality Standards for Oxides of Nitrogen and Oxides of Sulfur.* EPA-452/R-11-005a. Office of Air Quality Planning and Standards, Research Triangle Park, NC. February. Available on the Internet at *http://www.epa.gov/ttnnaaqs/standards/no2so2sec/data/20110204pamain.pdf.*

(2) that HCl can transport longer distances than previously thought (given its presence in remote ecosystems, and (3) that it can be a larger driver of acidification than previously thought. The fact that this study took place in the U.K. is itself irrelevant. The chemical interactions of HCl in water are the same the world over and sensitive ecosystems exist in the U.S. as well as in Europe as illustrated in the ecological risk assessment[301] for NOX and SOX. Furthermore, the commenter is factually incorrect that EPA is justifying that it is appropriate and necessary to regulate HAP emissions from EGUs based on this one study. The EPA agrees with the commenter that Hg exposure in wildlife is responsible for various adverse health effects in many species across the U.S. and recognizes that research is ongoing in this area. As discussed in the preamble to the proposed rule, the EPA agrees that there are potential environmental risks from exposures of ecosystems through Hg and non-Hg HAP deposition. The EPA cited relevant articles from the special edition of *Ecotoxicology*[302] mentioned by the commenter in the ecosystem effects section on Chapter 5 of the RIA for this rule, which is available in the docket.

G. EPA Affirms the Finding That It Is Appropriate and Necessary to Regulate EGUs To Address Public Health and Environmental Hazards Associated With Emissions of Hg and Non-Hg HAP From EGUs

In response to peer reviews of both the Hg and non-Hg HAP risk analyses, and taking into account public

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[301] U.S. EPA, 2009.

[302] *Ecotoxicology* 17:83-91, 2008.

comments, the EPA conducted revised analyses of the risks associated with emissions of Hg and non-Hg HAP from U.S. EGUs. These revised analyses demonstrated that the risk results reported in the preamble to the proposed rule are robust to revisions in response to the peer reviews and public comments.

Specifically, the revised Hg Risk TSD shows that up to 29 percent of modeled watersheds have populations potentially at-risk from exposure to Hg from U.S. EGUs.[303] This 29 percent of watersheds with populations potentially at-risk includes up to 10 percent of modeled watersheds where deposition from U.S. EGUs alone leads to potential exposures that exceed the MeHg RfD, and up to 24 percent of modeled watersheds where total potential exposures to MeHg exceed the RfD and U.S. EGUs contribute at least 5 percent to Hg deposition. Each of these results independently supports our conclusion that U.S. EGUs pose hazards to public health.

In the preamble to the proposed rule and in the 2000 finding, the EPA explained at length the serious nature of the health effects associated with Hg exposures, and the persistent nature of Hg in the environment. Congress specifically recognized the significant impacts of persistent bioaccumulative pollutants, like Hg, when it enacted section 112(c)(6), which requires the EPA to subject source categories listed pursuant to that section to MACT standards. Congress also required certain studies be conducted under CAA section 112(n) regarding the health effects of Hg. The EPA interprets CAA section 112(n)(1), with

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[303] This corresponds to 28 percent of modeled watersheds with populations potentially at-risk in the analysis reported in the preamble to the proposed rule.

regard to Hg, as intended to protect the public, including sensitive populations, against exposures to Hg from EGUs that would exceed the level determined by the EPA to be without appreciable risk, *e.g.*, exposures that are above the RfD for methylmercury (MeHg), or would contribute additional risk in areas where Hg exposures exceed the RfD due to contributions from all sources of Hg. Our recent technical analyses show that 98 percent of the watersheds for which we had fish tissue data have total Hg deposition such that potential exposures exceed the MeHg RfD, above which there is an increased risk of adverse effects on human health. In these watersheds, any reductions in exposures to Hg will reduce risk, and thus the incremental contribution to Hg exposure from any individual source or group of sources, such as EGUs, may reasonably be anticipated to cause additional risk.

As we have explained, in calculating the estimates described above, the EPA has used peer-reviewed methods, and focused on populations likely to be at higher risk of exposure to Hg from U.S. EGUs, *e.g.*, female subsistence fishing populations consuming at the 99th percentile fish consumption rate. The EPA did not, however, use the most conservative assumptions that would lead to upper bound risk estimates. As discussed above and in the revised Hg Risk TSD, we did not use the highest fish tissue cooking loss adjustment factor that was reported in the literature, which, had we done so, would have increased the estimates of Hg exposure substantially. Thus, we believe our analysis could understate risk to the most exposed individual, noting that we have focused on the 99th percentile consumption rate in our estimates.

Further, we were able to assess potential Hg exposures in only a small subset of generally representative watersheds in the U.S. because our analysis was necessarily premised on those water bodies for which we had fish tissue Hg samples. Specifically, we analyzed 3,141 of the approximately 88,000 watersheds in the United States. This limited set of watersheds excludes several of the watersheds with the highest U.S. EGU attributable deposition, and may also not have included watersheds with the highest sensitivity to Hg deposition, *e.g.*, the highest methylation rates (see above). Nevertheless, our analysis of the subset of watersheds we examined demonstrates that almost one third of the watersheds are estimated to have Hg deposition attributable to U.S. EGUs that contributes to potential exposures above the MeHg RfD. The SAB confirmed that the subset of watersheds we examined is sufficient.

Considering these points and the information on Hg in the record, the EPA believes that 10 percent of watersheds with populations at risk due to U.S. EGU emissions alone is unacceptable, as is 24 percent of watersheds with populations at risk due to U.S. EGU contributions in conjunction with total deposition from other sources. Taking into account the percentage of watersheds at risk, and the potential for even higher percentages to be at risk using more conservative risk assumptions and a more complete coverage of high U.S. EGU Hg deposition watersheds, the EPA concludes that Hg emissions from U.S. EGUs pose a hazard to public health.

Given these findings, and considering that (1) the revised risk analysis showed the percent of modeled watersheds with populations potentially at-risk increased from 28 to 29 percent, and (2) the revised

analysis includes 36 percent more watersheds, which significantly expands the coverage in several states, we conclude that the finding that emissions of Hg from U.S. EGUs pose a hazard to public health is confirmed by the national-scale revised Hg Risk TSD. As a result, we conclude that it remains appropriate to regulate Hg emissions from U.S. EGUs because those Hg emissions pose a hazard to public health.

With regards to the revised non-Hg inhalation case studies, the highest estimated individual lifetime cancer risk for the one case study facility (out of 16) with oil-fired EGUs is estimated to be 20 in a million, driven by Ni emissions. For the facilities with coal-fired EGUs, there were five (out of 16) with maximum individual cancer risks greater than one in a million (the highest was five in a million), four of which were driven by emissions of Cr(VI), and one of which was driven by emissions of Ni. Therefore, a total of six facilities exceed the criterion for EGUs to be regulated under CAA section 112. There were also two facilities with coal-fired EGUs with maximum individual cancer risks at one in a million. In the preamble to the proposed rule, we reported that the maximum individual lifetime cancer risk for the one facility with oil-fired EGUs was estimated to be 10 in a million, and that there were 3 coal-fired EGU facilities with maximum individual cancer risks greater than 1 in a million (the highest was 8 in a million), and 1 coal-fired EGU facility with maximum individual cancer risks equal to 1 in a million. Given that (1) the lifetime cancer risk for the oil-fired EGU facility has increased from 10 to 20 in a million, (2) the number of coal-fired EGU facilities with cancer risks greater than 1 in a million has increased from 3 to 5, and (3) the highest risk coal-fired facility still has cancer risks of 5 in a million, which is above the 1 in a million benchmark,

we conclude that the finding that emissions of non-Hg HAP from U.S. EGUs pose a hazard to public health is confirmed by the revised non-Hg risk inhalation case studies.

Moreover, some HAP emissions from U.S. EGUs contribute to adverse ecosystem effects. While we did not do new analyses on these topics, we reiterate that (1) Hg emissions from U.S. EGUs pose a hazard to the environment, contributing to adverse impacts on fish-eating birds and mammals, (2) Hg is a persistent bioaccumulative environmental contaminant, and as a result, failing to control Hg emissions from U.S. EGU sources will result in long-term environmental loadings of Hg, above and beyond those loadings caused by immediate deposition of Hg within the U.S.; controlling Hg emissions from U.S. EGUs helps to reduce the potential for environmental hazard from Hg now and in the future, and (4) it is appropriate to regulate those HAP which are not known to cause cancer but are known to contribute to chronic non-cancer toxicity and environmental degradation, such as the acid gases. In addition, we have identified effective controls available to reduce Hg and non-Hg HAP emissions.

In summary, we confirm the findings that Hg and non-Hg HAP emissions from U.S. EGUs each pose hazards to public health and that it remains appropriate to regulate U.S. EGUs under CAA section 112 for those reasons. We also conclude that it remains appropriate to regulate EGUs under CAA section 112 because of the magnitude of Hg and non-Hg emissions and the environmental effects of Hg and some non-Hg emissions, each of which standing alone, supports the appropriate finding. The availability of controls to

reduce HAP emissions from EGUs only further supports the appropriate finding.

Our revised analyses still show that in 2016 after implementation of other provisions of the CAA, HAP emissions from U.S. EGUs are reasonably anticipated to pose hazards to public health; therefore, it is necessary to regulate EGUs under CAA section 112. Moreover, HAP emissions from U.S. EGUs are expected to continue to contribute to adverse ecosystem effects. In addition, based on evaluation of the regulations required by the CAA, including the recent CSAPR, it is necessary to regulate U.S. EGUs under CAA section 112 because the only way to ensure permanent reductions in HAP emissions from U.S. EGUs and the associated risks to public health and the environment is through standards set under CAA section 112. While CSAPR is projected to achieve some Hg reductions due to co-control of Hg provided by controls put in place to achieve required reductions in SO[2] emissions, the results of the revised Hg Risk TSD indicate that an unacceptable percentage of modeled watersheds have populations potentially at-risk from U.S. EGU-attributable Hg deposition would remain after implementation of CSAPR. While we modeled slightly higher Hg emissions from U.S. EGUs (*i.e.*, 29 tons of Hg) in our risk analysis compared to the most recent estimate of 27 tons, we do not believe this 2 ton difference would substantially change our finding that Hg emissions from U.S. EGUs pose a hazard to public health or the Hg risks reported in the preamble to the proposed rule, as this represents less than a 10 percent reduction in Hg emissions. In addition, the actual reductions in Hg that will occur due to application of controls to meet the SO_2 emissions requirements of CSAPR may differ from those projected to occur, due to differences in the

technologies that individual EGU sources choose to install. The only way to ensure reductions in Hg, including those modeled as resulting from the CSAPR, is to directly regulate Hg emissions under CAA section 112.

In summary, we confirm the findings that it is necessary to regulate HAP emissions from U.S. EGUs because (1) the national-scale Hg Risk TSD shows that the hazards to public health posed by Hg emissions from U.S. EGUs will not be addressed through imposition of the CAA, (2) we cannot be certain that the identified cancer risks attributable to U.S. EGUs will be addressed through imposition of the requirements of the CAA, (3) the environmental hazards posed by acidification will not be fully addressed through imposition of the CAA, (4) regulation under CAA section 112 is the only way to ensure that all HAP emissions reductions that have been achieved since 2005 remain permanent, and (5) direct control of Hg emissions affecting U.S. deposition is only possible through regulation of U.S. emissions as we are unable to control global emissions directly. All of these findings independently support a finding that it is necessary to regulate U.S. EGUs under CAA section 112.

Based on these findings, the Agency affirms its finding that it remains appropriate and necessary to regulate coal- and oil-fired EGUs under CAA section 112, and maintains that the inclusion of coal- and oil-fired EGUs on the CAA section 112(c) list of source categories regulated under CAA section 112 remains valid.

IV. Denial of Delisting Petition

During the comment period on the proposed rule, UARG submitted a petition pursuant to CAA section 112(c)(9), asking the Agency to delete a portion of the EGU source category from the list of source categories to be regulated under CAA section 112. Specifically, UARG asks that EPA delist coal-fired EGUs from the CAA section 112(c) source category list. A copy of UARG's petition has been placed in the docket for today's rulemaking, along with the analysis conducted by EPRI that UARG uses to support its petition (hereinafter referred to as UARG's analysis). In support of its petition, UARG asserts that: (1) No coal-fired EGU or group of coal-fired EGUs will emit HAP in amounts that will cause a lifetime cancer risk greater than one in one million; and (2) no coal-fired EGU or group of coal-fired EGUs will emit non-carcinogenic HAP in amounts that will exceed a level which is adequate to protect public health with an ample margin of safety or cause adverse environmental effects. We disagree with UARG's assertions and for the reasons set forth below are denying UARG's petition to delist coal-fired EGUs from the section 112(c) source category list.

A. Requirements of CAA Section 112(c)(9)

CAA section 112(c)(9)(B) provides that "[t]he Administrator may delete any source category" from the section 112(c) source category list if the Agency determines that: (i) For HAP that may cause cancer in humans, "no source in the category (or group of sources in the case of area sources) emits such hazardous air pollutants in quantities which may cause a lifetime risk of cancer greater than one in one million to the individual in the population who is most exposed to emissions of such pollutants from the source (or group

of sources in the case of area sources)"; and (ii) for HAP that may result in human health effects other than cancer or adverse environmental effects, "a determination that emissions from no source in the category or subcategory concerned (or group of sources in the case of area sources) exceed a level which is adequate to protect public health with an ample margin of safety and no adverse environmental effect will result from emissions from any source."

The EPA has the discretion to delete a source category under CAA section 112(c)(9)(B), but only if EPA concludes that the relevant requirements of CAA section 112(c)(9)(B) have been met. HAP emissions from EGUs present both cancer risks, which implicate the requirements of CAA section 112(c)(9)(B)(i), and non-cancer human health effects or adverse environmental effects, which implicate the requirements of CAA section 112(c)(9)(B)(ii). As such, UARG bears the burden of demonstrating that the requirements of *both* clauses are met.

B. Rationale for Denying UARG's Delisting Petition

The EPA is denying UARG's petition to delist EGUs from the CAA section 112(c) source category list. UARG improperly seeks to delist a portion of a CAA section 112(c) listed source category that emits carcinogens, which is contrary to the plain language of CAA section 112(c)(9). Even setting aside this fundamental defect, UARG has failed to meet the requirements of CAA section 112(c)(9)(B).

1. UARG's Attempt to Delist a Portion of a Listed Source Category Conflicts With D.C. Circuit Precedent

In December 2000, the EPA listed coal- and oil-fired EGUs as a single source category. UARG asks the

Agency to delist a portion of that listed source category: Coal-fired EGUs. UARG's request conflicts, however, with D.C. Circuit precedent, which provides that for categories, like EGUs, that pose cancer risks, the EPA may not delist a portion of a source category. *NRDC v. U.S. EPA, 489 F.3d 1364 (D.C. Cir. 2007).* Specifically, in *NRDC*, the D.C. Circuit held that the Agency's attempt to delist a "low-risk" subcategory was "contrary to the plain language of the statute," and that the statute only authorized the agency to remove source categories pursuant to section 112(c)(9). *Id. at 1373* ("Because EPA's interpretation of Section 112(c)(9) as allowing it to exempt the risk-based subcategory is contrary to the plain language of the statute, the EPA's interpretation fails at Chevron step one.").

UARG's request is indistinguishable from the situation before the court in *NRDC*. UARG does not seek to delist coal- and oil-fired EGUs, which is the source category that EPA listed, but rather a portion of that category. UARG also does not dispute that coal-fired EGUs emit carcinogenic HAP. Because UARG's request to delist is contrary to the plain language of CAA section 112(c)(9)(B) and *NRDC*, we are denying the delisting petition.

2. Even Assuming, for the Sake of Argument, That EPA Could Delist a Portion of a Source Category, UARG has Failed to Meet the Requirements of CAA Section 112(c)(9)

Even assuming, for the sake of argument, that EPA could delist a portion of a source category that emits carcinogens, which it cannot, UARG has failed to demonstrate that the requirements for delisting in CAA section 112(c)(9)(i) and (ii) have been met. UARG contends that it used EPA's models and approaches,

as well as the most recent data. We have carefully reviewed UARG's analyses, however, and found certain flaws that we believe bias their risk results low. Specifically, we identified flaws in emissions estimation. UARG developed estimates for all EGU facilities using data which pre-date the 2010 ICR emissions measurement data that EPA obtained to support this rule. UARG also relied upon an emissions equation developed by EPRI and DOE to develop its metal emissions estimates. With regard to that approach, the EPA analysis of the ICR data has found that the regression approach is not a good predictor of actual EGU emissions. Furthermore, we found fault with their use of the geometric mean and their outlier analysis for computing emission factors. The EPA analysis has found that the geometric mean approach underpredicts actual emissions by an average of more than seventy percent. This had an especially large impact on the arsenic, chromium, and nickel emissions estimates. These and other issues are explained in further detail in the response to comments document. As a result, we believe the resulting risk estimates in UARG's analysis are biased low. In addition, we note that there are dispersion model refinements that are not included in the UARG analyses, but were included in EPA's analysis. For example, for the dispersion modeling of the 16 non-Hg case studies, the EPA considered building downwash and used time-varying emissions, neither of which were used in UARG's analysis. These factors could also bias the UARG risk estimates low.

However, even taking UARG's analysis at face value and accepting, for arguments' sake, their assumptions and emissions estimates, UARG's own data supports denial of the petition because UARG itself identifies a maximum individual cancer risk exceeding 1 in a

million, which is the statutory threshold in CAA section 112(c)(9)(B)(i). Specifically, UARG's multi-pathway model plant ingestion risk analysis concluded that adult anglers would face cancer risks of 4 in a million. For this reason alone, the petition should be denied.

UARG dismisses the 4 in a million cancer result, arguing that the refined model plant multipathway risk assessment that it conducted is "overly conservative." UARG conducted its multi-pathway risk analysis to evaluate the risks associated with ingesting persistent and bioaccumulative HAP which are emitted into the atmosphere and subsequently deposit into the environment and bioaccumulate in animals which are eventually consumed as food. Instead of conducting this multipathway analysis for each EGU facility, UARG instead analyzed multi-pathway risks by evaluating a single model plant. Nothing in the record indicates, however, that UARG's model plant represents the worst-case scenario for cancer human health risks from any EGU. Indeed, although UARG claims in its petition that the site selected for its case study is "likely as close to a worst-case scenario as is possible given the numerous variables associated with ingestion pathway risks" (UARG petition at 12), the supporting documentation for that case study specifically acknowledges that its fictional model plant scenario "is not intended to represent the risk due to emissions from an actual plant or the highest level of risk that could be associated with a coal-fired power plant at any location" (EPRI at 1). The statute requires that no source in the category may cause a lifetime cancer risk greater than one in one million to the most exposed individual, and UARG has failed to make this showing. UARG has neither modeled multi-pathway

risks for a worst-case model facility, nor evaluated the multipathway risks associated with each individual EGU facility. Accordingly, UARG has not made the demonstration required by CAA section 112(c)(9)(B)(i). But, even focusing on the multi-pathway risk analysis that UARG did conduct, which admittedly does not represent a worst-case facility, UARG's analysis still shows cancer risks greater than one in a million. Accordingly, UARG's petition must be denied.

Although it is not necessary to reach the requirements of CAA section 112(c)(9)(B)(ii) that address non-cancer human health risks, we note that UARG has also failed to show that "emissions from no source in the category * * * exceed a level which is adequate to protect public health with an ample margin of safety." Again, even accepting, for argument's sake, the conclusions in UARG's analysis, UARG only evaluated the non-cancer *inhalation* risks associated with each EGU facility. It did not conduct a similar analysis to assess multipathway risks for each EGU facility. Instead, it conducted a model plant analysis and admits that such model plant does not represent the worst-case scenario for noncancer human health risks from any EGU. Thus, the analysis fails to fully characterize noncancer multipathway risks for the source category, and UARG's petition must be denied on this basis as well.

Finally, UARG failed to meet its burden of showing that "no adverse environmental effect will result from emissions from any source" pursuant to CAA section 112(c)(9)(B)(ii). UARG analyzed environmental effects only in conjunction with its model plant. Because UARG's model plant does not represent the worst-case scenario for environmental effects, UARG's analysis falls short and fails to characterize fully the potential

environmental impacts, and UARG's petition must be denied.

For all of these reasons, the EPA denies UARG's petition to delist coal-fired EGUs from the CAA section 112(c) source category list.

C. EPA's Technical Analyses for the Appropriate and Necessary Finding Provide Further Support for the Conclusion That Coal-Fired EGUs Should Remain a Listed Source Category

The EPA reasonably concluded in December 2000, based on the information available to the Agency at that time, that it was appropriate and necessary to regulate coal- and oil-fired EGUs under CAA section 112 and added such units to the list of source categories subject to regulation under CAA section 112(d). As discussed in section III above, the EPA conducted additional, extensive technical analyses based on recent data that confirm it remains appropriate and necessary to regulate HAP from coal- and oil-fired EGUs, because such EGUs continue to pose hazards to public health. HAP emissions from coal- and oil-fired EGUs also continue to cause adverse environmental effects. UARG advances several arguments, challenging the analyses the Agency completed in support of the proposed rule. We address those arguments in section III above. The Agency's analyses supporting the appropriate and necessary finding confirm that EGUs cannot be delisted pursuant to CAA section 112(c)(9).

Specifically, as explained further in section III above, the EPA analyzed non-Hg inhalation risks from 16 EGU facility case studies, including both coal- and oil-fired EGUs, as part of its technical analyses

supporting the appropriate and necessary finding. That analysis demonstrates that there are 6 EGU facilities (of the 16 that we analyzed) with cancer risks exceeding one in one million. These cancer risk levels exceed the delisting criteria set forth in CAA section 112(c)(9)(B)(i), and confirm that EGUs must remain a listed source category. As explained above, some commenters assert that EPA's analysis of non-Hg inhalation risks from EGUs conducted in support of the proposal for this rulemaking overstated emissions from, and risks associated with, EGUs. These commenters argue that the analysis supporting UARG's petition more appropriately assesses EGU risk. The EPA disagrees with these comments and addresses these comments in section III above.

Significantly, the EPA based its analysis of 16 case study EGUs directly on the 2010 emissions test data from EGUs obtained through the ICR. The EPA's 16 case study analysis used emissions data either taken directly from the 2010 emissions test data, or derived using emissions factors based on the 2010 data for similar EGU units. The EPA also included dispersion model refinements in its final case studies, as noted above. Further, the EPA re-analyzed the 16 case studies that we conducted for the proposal and revised those analyses consistent with new non-Hg HAP emissions data and corrected stack parameters provided by commenters (including UARG) during the comment period on the proposed rule. The EPA received revised information concerning emissions tests, stack heights and stack diameters for some of the case study EGU facilities. The EPA incorporated all of these corrections into our analysis and then re-analyzed the risks for the 16 case study facilities. When completed, the EPA determined that the corrections incorporated into the reanalysis had little

effect on the overall results. In the final rule, the EPA concludes that the maximum individual inhalation cancer risks for 6 out of the 16 case study EGU facilities are greater than 1 in a million. These cancer risk levels confirm that EGUs do not satisfy the delisting criterion of CAA section 112(c)(9)(B)(i) and thus should remain a listed source category.

The EPA's national-scale Hg Risk TSD supporting the appropriate and necessary finding also confirm that Hg emissions from coal- and oil-fired US EGUs are reasonably anticipated to pose a hazard to public health. As discussed in section III above, the EPA interprets CAA section 112(n)(1), with regard to mercury, as intended to protect the public, including sensitive populations, against exposures to Hg from EGUs that would exceed the level determined by EPA to be without appreciable risk, e.g., exposures that are above the RfD for methylmercury (MeHg), or would contribute additional risk in areas where Hg exposures exceed the RfD due to contributions from all sources of Hg.

In order to determine whether EGU Hg emissions pose a hazard to public health, the EPA conducted a national-scale Hg Risk TSD focused on populations with high levels of self-caught freshwater fish consumption. The results of the Hg Risk TSD show that 98 percent of modeled watersheds have total exposures to MeHg that exceed the MeHg RfD, above which there is an increased risk of adverse effects on human health. In these watersheds, any reductions in exposures to Hg will reduce risk, and thus the incremental contribution to Hg exposure from any individual source or group of sources, such as EGUs, may reasonably be anticipated to cause additional risk. The Hg Risk TSD focused on those watersheds

that either exceeded the RfD based on U.S. EGU attributable deposition alone, without considering other sources of deposition, or watersheds that exceed the RfD due to total Hg deposition and to which U.S. EGUs contributed at least 5 percent of the Hg deposition. The results of that analysis show that up to 29 percent of the modeled watersheds have populations that are potentially at-risk from exposure to Hg from U.S. EGUs, including up to 10 percent of modeled watersheds where deposition from U.S. EGUs alone leads to potential exposures that exceed the MeHg RfD, and up to 24 percent of modeled watersheds where total potential exposures to MeHg exceed the RfD and U.S. EGUs contribute at least 5 percent to Hg deposition. This approach to assessing national risks from Hg deposition from EGUs was supported by the independent peer review conducted by the Science Advisory Board, as discussed fully in section III.

Finally, as discussed in section III, based on this assessment, the EPA has confirmed that Hg emitted from U.S. EGUs pose a hazard to public health and it is appropriate to regulate U.S. EGUs under CAA section 112. This determination and the confirmatory assessments support our conclusion that UARG's delisting petition must be denied.

UARG attempts to dismiss the results of EPA's national-scale Hg Risk TSD, arguing that EPA cannot consider the risks posed by EGUs in conjunction with any other risks, including those from other source categories. Nothing in CAA section 112(c)(9), however, provides that the Agency cannot consider background or emissions due to other sources. CAA section 112(c)(9)(B)(ii) provides that "no source in the category or subcategory concerned (or group of sources in the

case of area sources) exceed a level which is adequate to protect public health with an ample margin of safety and no adverse environmental effect will result from emissions from any source." This language could be read to provide that the Agency consider only the risks associated with the source category at issue, and ignore how those risks fit with real-world exposures.[304] However, the language could also be read to provide that the Agency consider the cumulative effect of HAP emissions from the individual sources in the category in conjunction with the HAP emissions from other sources. The latter is a reasonable interpret-ation, especially when considering how the public is exposed to HAP emissions. Considering the individual sources in a source category in isolation treats the sources as if they exist in a vacuum, which does not mirror reality. Such an approach is particularly problematic for environmentally persistent HAP that bio-accumulate in the food chain, such as mercury. [305]

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[304] The same is true with respect to section 112(c)(9)(B)(i).

[305] In a prior rulemaking, EPA stated that the language in section 112(c)(9)(B)(ii) "does not direct EPA to extend its analysis to either emissions from other sources in other categories or subcategories or to non-attributable background concentrations." *71 FR 8347* (Feb. 16, 2006). The preamble to that rule repeatedly states that the "focus" of the delisting determination in that rule was on emissions from sources in the category under review. *See 71 FR 8346-47.* The preamble went on to compare section 112(c)(9)(B) to section 112(f)(2)(A) in a way that suggested that EPA can consider risks presented by sources other than the subject source category under section 112(f)(2), but not under section 112(c)(9). We do not believe the language of section 112(c)(9) compels any different treatment. The section 112(f) analysis occurs after a source category has already complied with section 112(d) standards, whereas, potential delistings under section 112(c)(9) may involve source categories unregulated by section 112. A delisting decision is significant in that the category

Here, the record demonstrates that 98 percent of the watersheds EPA modeled have total exposures to MeHg that exceed the MeHg RfD, above which there is increased risk of adverse effects on human health, especially on the developing nervous systems of children during gestation. EGUs remain one of the largest unregulated sources of Hg emissions, and those emissions continue to contribute to Hg exposures and risk. UARG seeks to ignore the fact that exposures above the RfD exist in almost every watershed we modeled, and instead focuses on the contribution provided solely by EGUs. The EPA did as UARG asked and found that up to 10 percent of modeled watersheds where deposition from U.S. EGUs alone leads to potential exposures that exceed the MeHg RfD. Thus, even focusing on EGU emissions in a vacuum, which we do not believe is appropriate or required under CAA section 112(c)(9), we still found that up to 10 percent of the watersheds exceed the RfD due to EGU emissions even before taking into account the numerous other sources of Hg deposition, and we believe this to be an unacceptable percentage of watersheds above the RfD. Due to the persistent, bioacccumulative nature of Hg, among other factors, we believe it is appropriate to consider the combined impact of Hg emissions from EGUs and other sources of Hg. Thus, we also considered the 24 percent of modeled watersheds where, even though U.S. EGU emissions alone are not enough to cause exposures that exceed the RfD, those emissions contribute at

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that is delisted will no longer be subject to HAP regulation under the Act. It is difficult to justify why we would examine risks from other sources under section 112(f), but not under section 112(c)(9), where Congress established such a specific test for delisting.

least 5 percent of total exposures to MeHg that exceed the RfD. The combined total of 29 percent of modeled watersheds where U.S. EGUs cause or contribute to MeHg exposures above the RfD is clearly unacceptable and thus the UARG petition to delist must be denied.

Thus, the technical analyses the Agency conducted in support of the appropriate and necessary finding confirm that EGUs should remain a listed source category.

V. Summary of This Final NESHAP

This section summarizes the requirements of the final EGU NESHAP. Section VI below summarizes the significant changes to this final rule following proposal.

A. What is the source category regulated by this final rule?

This final rule affects coal- and oil-fired EGUs.

B. What is the affected source?

An existing affected source under this final rule is the collection of coal- or oil-fired EGUs in a subcategory within a single contiguous area and under common control. A new affected source is each coal- or oil-fired EGU for which construction or reconstruction began after May 3, 2011.

CAA section 112(a)(8) defines an EGU as: a fossil fuel-fired combustion unit of more than 25 megawatts that serves a generator that produces electricity for sale. A unit that cogenerates steam and electricity and supplies more than one-third of its potential electric output capacity and more than 25 megawatts electrical output to any utility power distribution system for sale shall be considered an electric utility steam generating unit.

If an EGU burns coal (either as a primary fuel or as a supplementary fuel) or any combination of coal with another fuel (except for solid waste as noted below) where the coal accounts for more than 10.0 percent of the average annual heat input during any 3 consecutive calendar years or for more than 15.0 percent of the annual heat input during any one calendar year after the applicable compliance date, the unit is considered to be coal-fired under this final rule.

If a unit is not a coal-fired unit and burns only oil or burns oil in combination with a fuel other than coal (except solid waste as noted below) where the oil accounts for more than 10.0 percent of the average annual heat input during any 3 consecutive calendar years or for more than 15.0 percent of the annual heat input during any one calendar year after the applicable compliance date, the unit is considered to be oil-fired under this final rule.

As noted below, the EPA is finalizing in this rule a definition to determine whether the combustion unit is "fossil fuel fired" such that it is considered an EGU as defined in CAA section 112(a)(8) and, thus, potentially subject to this final rule. In addition, using the construct of the definition of "oil-fired" from the ARP, we are finalizing in this rule a requirement that the unit fire coal or oil (or natural gas), or any combination thereof, for more than 10.0 percent of the average annual heat input during any 3 consecutive calendar years or for more than 15.0 percent of the annual heat input during any one calendar year to be considered a "fossil fuel-fired" EGU as defined in CAA section 112(a)(8). However, if a new or existing EGU is not coal- or oil-fired, and the unit burns natural gas exclusively or burns natural gas in combination with another fuel where the natural gas constitutes 10

percent or more of the average annual heat input during any 3 calendar years or 15 percent or more of the annual heat input during any 1 calendar year, the unit is considered to be natural gas-fired EGU and not subject to this final rule. As discussed later, we believe that this definition will address those situations where an EGU co-fires limited amounts of either coal or oil with natural gas or other non-fossil fuels (e.g., biomass).

If an EGU combusts solid waste, standards issued pursuant to CAA section 129 apply to that EGU, rather than this final rule.

C. What are the pollutants regulated by this final rule?

For coal-fired EGUs, this final rule regulates HCl as a surrogate for acid gas HAP, with an alternate of SO[2] as a surrogate for acid gas HAP for coal-fired EGUs with FGD systems installed and operational; filterable PM as a surrogate for non-mercury HAP metals, with total non-mercury HAP metals and individual non-mercury HAP metals as alternative equivalent standards; Hg; and organic HAP. For oil-fired EGUs, this final rule regulates HCl and HF; filterable PM as a surrogate for total HAP metals, with individual HAP metals as alternative equivalent standards; and organic HAP.

D. What emission limits and work practice standards must I meet and what are the subcategories in the final rule?

We are finalizing the emission limitations presented in Tables 3 and 4 of this preamble. Within the two major subcategories of "coal" and "oil," emission limitations were developed for new and existing sources for seven subcategories, two for coal-fired

EGUs, one for IGCC EGUs burning synthetic gas derived from coal- and/or solid oil-derived fuel, one for solid oil-derived fuel-fired EGUs, and four for liquid oil-fired EGUs, as described in more detail below. The limited-use liquid oil-fired subcategory, discussed elsewhere in this preamble, is not presented in Table 3 because only work practice standards apply to this subcategory.

Table 3—Emission Limitations for Coal-Fired and Solid Oil-Derived Fuel-Fired EGUs

Subcategory	Filterable particulate matter	Hydrogen chloride	Mercury
Existing--Unit not low rank virgin coal	3.0E-2 lb/MMBtu (3.0E-1 lb/MWh)	2.0E-3 lb/MMBtu (2.0E-2 lb/MWh)	1.2E0 lb/TBtu. (1.3E-2 lb/GWh).
Existing--Unit designed low rank virgin coal	3.0E-2 lb/MMBtu (3.0E-1 lb/MWh)	2.0E-3 lb/MMBtu (2.0E-2 lb/MWh)	1.1E+1 lb/TBtu. (1.2E-1 lb/GWh). 4.0E0 lb/TBtu fna . (4.0E-2 lb/GWh fna).
Existing--IGCC	4.0E-2 lb/MMBtu (4.0E-1 lb/MWh)	5.0E-4 lb/MMBtu (5.0E-3 lb/MWh)	2.5E0 lb/TBtu. (3.0E-2 lb/GWh).
Existing--Solid oil-derived	8.0E-3 lb/MMBtu (9.0E-2 lb/MWh)	5.0E-3 lb/MMBtu (8.0E-2 lb/MWh)	2.0E-1 lb/TBtu. (2.0E-3 lb/GWh).

Table 3—Emission Limitations for Coal-Fired and Solid Oil-Derived Fuel-Fired EGUs

Subcategory	Filterable particulate matter	Hydrogen chloride	Mercury
New--Unit not low rank virgin coal	7.0E-3 lb/MWh	4.0E-4 lb/MWh	2.0E-4 lb/GWh.
New--Unit designed for low rank virgin coal	7.0E-3 lb/MWh	4.0E-4 lb/MWh	4.0E-2 lb/GWh.
New--IGCC	7.0E-2 lb/MWh fnb 9.0E-2 lb/MWh fnc	2.0E-3 lb/MWh fnd	3.0E-3 lb/GWh fne
New--Solid oil-derived	2.0E-2 lb/MWh	4.0E-4 lb/MWh	2.0E-3 lb/GWh.

Note: lb/MMBtu = pounds pollutant per million British thermal units fuel input.

lb/TBtu = pounds pollutant per trillion British thermal units fuel input.

lb/MWh = pounds pollutant per megawatt-hour electric output (gross).

lb/GWh = pounds pollutant per gigawatt-hour electric output (gross).

fna Beyond-the-floor limit as discussed elsewhere.

fnb Duct burners on syngas; based on permit levels in comments received.

fnc Duct burners on natural gas; based on permit levels in comments received.

fnd Based on best-performing similar source.

fne Based on permit levels in comments received.